THE WAR OF THE FUTURE

GENERAL VON BERNHARDI

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THE WAR OF THE FUTURE

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THE WAR OF THE FUTURE

IN THE LIGHT OF THE LESSONS OF THE WORLD WAR

BY

GENERAL VON BERNHARDI
AUTHOR OF "GERMANY AND THE NEXT WAR," ETC.

TRANSLATED BY

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PREFACE

The following pages were written either during the late war itself or shortly after it ended. The conclusions which they contain are entirely the product of the war. The immediate purpose of the book was to give to all officers who were not in a position to see the war from a central point a survey of the nature of modern war: to present them with a frame into which they could fit their special knowledge. Further I intended to suggest the principles on which the future development of the Army should be based.

That purpose has now become utterly vain.

A large proportion of our magnificent Corps of Officers lies on the battlefields; another part has been compelled to give up the splendid profession by wounds or disease; the rest has been dissolved side by side with the Army and is trying to pick up a precarious livelihood in other walks of life. Thus the number of my readers in that circle can be but small.

But that is not all. There is no longer a German Army, for the few men we are allowed to

keep after the Peace Treaty cannot be considered as such. Our colonies are a thing of the past. Our fleet is at the bottom of the sea. It would be sheer madness to think of preparing for war now, even if only in theory; for it is utterly impossible for us to make war. It would be a crime to hanker after war now when peace has just been concluded and it is the duty of us all to work for the economic recovery of our people. Moreover, our present Government is doing everything to eliminate war from international intercourse, and there can be no doubt that the success of this attempt will be very welcome so long as the interests and honor of the German nation can thereby be preserved. Whether this ambition will actually succeed is another question. I do not think so unless Germany submits blindly to the will of the hostile states around her, or human nature entirely changes. But no obstacles should be placed in the way of this effort; it should proceed in the most favorable conditions possible, and in these circumstances it would be a mistake to hint at a coming war.

If in spite of all this I am publishing my work and have found a publisher willing to take on the thankless task of printing it for the benefit of the public, I am pursuing a twofold

aim. In the first place I shall hope to show how a war—that is a war on modern lines—is utterly unthinkable for Germany, impoverished and broken. Secondly, it must be remembered that the military interest in the World War, which, with its subsequent effects, is undoubtedly ushering in a new period of world history, will very soon revive in all quarters. It is thus our duty to consider the important lessons of this great struggle, under the impressions of which we are still laboring, to visualize and grasp them so that coming generations who may have to apply them cannot charge us with irresponsible negligence and carelessness. This book is to meet that theoretical need and proclaim our helplessness. It is, therefore, far from any desire or intention to sharpen the sword of vengeance. Its purpose is only to show that as things are we are no longer physically able to do so; it will teach about the war which we are no longer in a position to make.

For the rest, there will doubtless be many gaps in my work. That is inevitable, because to all intents and purposes I am basing my observations on personal experience, and that must necessarily be limited. I shall be grateful

to any one who feels called on to supplement what I have to say.

Mountain warfare is left undiscussed of set purpose, as I have had no personal experience of it. Some one with greater qualifications must write on that subject. From my own personal experience I can only say here that there are doubtless many points of comparison with trench warfare in France, so that my remarks on this aspect are in many respects applicable to that also.

VON BERNHARDI
General

CUNNERSDORF

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INTRODUCTION

In my book *Vom heutigen Kriege*,[1] which appeared in 1911, I showed that the great fundamental laws of war remained the same at all times and in all circumstances, because they were based on human nature and the very essence of the use of force. I demonstrated, however, that their outward manifestations frequently varied in accordance with the political structure and culture of the warring nation, and indeed with the means and methods employed in war. These very external manifestations have a compelling character and involve a certain adherence to rule, though only an adherence which changes periodically with the changing circumstances of life and military effort.

Thus the art of war moves between permanent laws and those which change periodically and are ever undergoing fresh development. It is only within these limits that our art offers the prospect of success to military undertakings.

[1] *Modern War.*

Neither the unchanging nor the periodic laws may be infringed with impunity, and it is the task of him who leads an army to give effect to the general and eternal elements of circumstances which have temporary peculiarities and features.

This is just where the difficulty lies, for there is always the danger that the commander will regard something which under certain given circumstances was in accordance with the rules, and therefore justifiable, as an eternal verity and therefore applicable even though the conditioning circumstances have already changed, so that he is acting under the impulse of preconceived opinions which, in view of the changed situation, must bring him to ruin and defeat.

Thus, in 1806, the Prussian army took the field with the old linear tactics which could no longer cope with the changed battle forms of the Napoleonic period, and in spite of all its heroism suffered a severe defeat. So again in 1866 the Austrians had been too late to realize the importance of the breech-loading rifle: they kept to their old percussion rifle and their Napoleonic columns and shock tactics, and were simply decimated by the Prussian infantry, which relied on its weapon and fought in open

formation. Examples of this kind can be multiplied at will. In such circumstances it is the commander who has to bear the consequences of insufficient preparation and energy on the part of the governments which have not realized the progress and development of the art of war or learned to keep pace with that development by prompt reforms.

But the commander is faced with the further danger of being overawed by external phenomena and under their pressure neglecting to give full effect to the great fundamental and eternal principles of war, either because he has an insufficient grasp of these principles himself or because his control of the war-machine is insufficient to enable him to apply his knowledge. The last Russian campaigns offer eloquent examples. In the war with Japan, for instance, Kuropatkin utterly underestimated the importance of the initiative and the offensive and confined himself to defensive operations—without any offensive reaction—from the outset. On the other hand, he was unable to maneuver and employ the mass of the Russian army, unwieldy and mentally inert as it was, in such a way as to do justice to his plans. Apart from the lack of the offensive spirit and many other defects, his schemes broke down time after time on the

want of judgment and resolution displayed by his subordinate commanders. He patently failed to remedy the friction in the military machine, friction which is a phenomenon of every war and was particularly noticeable in the great masses of the Russian army. Nor could he make the latter conform to the great laws of war.

These difficulties, which are of the very essence of war, have increased materially in recent times, for we also are living in a period of many changes in the external phenomena of war, a period of great development and transformation of many military values which seem calculated to confuse judgment and lead us on wrong paths. In the main this development began during the war itself and on many points has taken us by surprise. Of course, developments had been foreseen in some directions without our fully realizing how far they would go. In other directions we had foreseen nothing and got on wrong lines. But the voices which told us we were straying were not heeded.

That heavy artillery would play a more important rôle was expected and, within certain limits, allowed for. But we did not realize how great that rôle would be. The strength of for-

tresses was utterly exaggerated because the power of the hostile artillery was underestimated.

Nor had we foreseen what enormous masses of combatants would have to be called up for the World War. No measures were therefore taken for such a wholesale levy. The policy of peace at any price which we pursued, and our wholly baseless confidence that we should be allowed to pursue it, had blinded the eyes of our leading statesmen. All who raised a warning voice were denounced as unscrupulous firebrands or officially cautioned, and the army bills in the last years before the war were totally inadequate.

The importance of cavalry was totally misunderstood. It was considered an offensive weapon in spite of the obvious effects of modern firearms.

We hopelessly underestimated the importance of aircraft and, in naval operations, the submarine arm, the development of which was at the outset held up for the benefit of the battle-fleet. Lastly, we absolutely misunderstood the importance of the economic side, although warning voices were raised on this matter. We had made no sort of preparation for the blockade of all our ports and frontiers, or for a sit-

uation in which we should be completely cut off from maritime communication with our importing and exporting countries. The wholesale transformation of our economic system which those eventualities inevitably involved had to be improvised. Indeed, we had not even thought of warning and recalling our merchant vessels which were in foreign waters, so little did we believe in the possibility of war even when Russia was in the throes of mobilization.

It might be said that as a result of our total failure to realize the world situation we walked blindfolded into the trap which our enemies had set for us. However, we entered upon the struggle itself with the extended military and political views, so to speak, which had developed out of the war of 1870, and to a certain extent the experiences of the Russo-Japanese war. In the General Staff, indeed, thanks to tireless work, many of the requirements of the times had been realized, if not all. Unfortunately our efforts thoroughly to exploit our knowledge failed time and time again, owing to politically false judgments of the situation which not only prevailed in political circles but were reënforced by the chronic shortsightedness and prejudice of the Reichstag, which allowed itself to be swayed by domestic party contro-

versy and had lost all vision for the peril without. Before the war every one who pointed out the true significance of political developments was exposed to complete and hopeless misconstruction in these circles.

Thus, when the war assumed a scale which had never been foreseen, we found ourselves unprepared and faced by absolutely novel conditions, so that to cope with them we had to improvise in the very middle of the war. Both the army and the fleet have shown that they were quite equal to this colossal task and able to gain the upper hand in every department, even in a war against practically the whole world—a world which had prepared for this war for years. German science also has performed brilliant feats in assisting the combatant forces and, in the early years at any rate, German labor, with relatively few exceptions, proved itself an auxiliary force of the first rank in producing the weapons of war. The only failures were the civil government—notwithstanding devoted efforts on the part of many officials—and the politicians, who were too often influenced by the Reichstag, and by their defective measures made the nation's task in its heroic struggle considerably more arduous.

I shall not go in any detail into these matters

in this book, which deals with the purely military aspect alone, though it is only natural that the direct effects of politics and economic questions on the operations, as they have developed in present-day circumstances, must be examined and discussed, as those effects are of far-reaching military importance.

Otherwise my essential purpose is to inquire into the significance of all the novel phenomena of modern times which determine the form of military operations, phenomena some of which facilitate them, while others make them more arduous. Secondly, I have to consider how, in the changed circumstances, the great fundamental and vital principles which mean success in war can be vindicated even to-day: retaining the initiative; using the offensive as the decisive form of action; concentration of force at the decisive point; the determination of that point; the superiority of the moral factor to purely material resources; the proper relation between attack and defense; the will to victory; the unconditional dependence of policy on the requirements and results of strategy or military effort.

It is of vital importance to every army, and therefore every state, to be perfectly clear on these points. Thus, and thus alone, can policy

and war be successfully conducted. In that way only will states be in a position to develop their full powers unhindered.

There is a certain beautiful dream of nations living in peace side by side, voluntarily imposing restraints upon themselves and recognizing their obligation to have regard for the just needs and wishes of other states. It is a dream in which the peoples which are morally and intellectually the strongest will be in a position to assert themselves as the arbiters of culture, even though such a thing is impossible without a more or less autocratic authority, which is incompatible with equal rights.

But it is none the less a dream only. As long as men remain men, force in its widest sense will determine the political and cultural importance of states. In the last resort it is the foundation of all intellectual and moral progress.

THE WAR OF THE FUTURE

CHAPTER I

THE DETERMINING FACTORS IN MODERN WAR

When we look over the whole range of the lessons and experiences of the World War, we soon realize that they fall into two great groups, which are the determining factors in modern war: on the one side the employment of colossal armies such as the world had never seen, with all their attendant phenomena, and on the other the immense development of the mechanical side and chemistry, which have resulted in the appearance of a whole series of new weapons or weapons the power of which has been greatly increased. Both together have revolutionized war conditions.

The first group has mainly influenced strategy, though it is not without a certain tactical importance, while the new triumphs in military mechanics have primarily brought about tactical changes and have affected

strategy and maneuver to a secondary degree, and that to a certain extent indirectly.

I.—Masses

When we mobilized in 1914 we put a mighty army into the field. A large number of reserve divisions had been formed according to plan and a number of Landsturm battalions called up as frontier and railway guards. But it would be impossible to speak of a general summons of the nation to arms. We were not prepared for anything like that. We had neither the arms nor the equipment. Still, our army seemed strong enough to carry through our plan of campaign. This plan, in its main lines, was based on our belief in a slow Russian mobilization, and aimed at overthrowing France decisively at the outset and then concentrating against Russia which would meanwhile have been kept in check by a few army corps and an Austrian offensive.

This plan broke down because the Russian mobilization—though not perhaps officially—was actually in progress for a long time while we were still thinking it possible to preserve peace and taking steps with that end in view. East Prussia was overrun by the enemy before

we had thought it possible. Troops had to be brought from the west to protect the very core of Prussia, and the result was that in France our armies were not strong enough to exploit strategically the tactical successes they had gained. We had to fall back on the defensive and extend our front to the sea in order to save our right wing from envelopment.

As the Russians had meanwhile deployed all their armies and were pressing forward on a broad front, it became imperative to strengthen our armies, and we now proceeded to call upon the man-power of the whole nation for the benefit of the army. New army corps were formed of men who had not previously been called up, all the Landsturm were summoned to arms, and even depot troops were sent to the front to fill the yawning gaps. The enemy, however, replied with similar measures. In France the last man was called up. Savage peoples were brought to the European battlefields. Italy joined the ranks of our enemies. Rumania and finally America followed her example. Compulsory service was introduced in England. India had to send her dusky sons and Africa her black children to Europe.

Thus gradually those giant armies came into being which were compelled to stretch their line

from sea to sea, on the one hand to be safe against envelopment, and on the other to make full use of their weapons. It was a distribution of force which can be described by the expression "linear strategy." Then, with a view to increasing the powers of resistance of these far-flung lines—safe against envelopment—against frontal attacks by a superior force, and with the further purpose of keeping down the losses inflicted by shell fire in a long and stubborn defense, the process of fortifying the positions began. Deep trenches and shell-proof shelters were constructed to provide cover for both attacker and defender without preventing either from using his own weapons. Obstacles were erected to make it difficult for the enemy to approach and hold him down under the fire of the defender.

This form of battle had a vital influence upon the attacker also. In the first stage, in his endeavor to keep on enveloping the enemy lines, threaten their tactical flanks and upset or cut their communications, he was compelled to reach out ever farther until the sea or land frontiers stayed his progress. Then he had to change his method entirely.

Before the war the envelopment of one or both of the enemy's wings was considered the

decisive form of operation. The real problem of the commander was to bring about strategic envelopment and finally carry it through tactically. We entered the war imbued with those ideas. Our operations were in accordance with them at the beginning of the war, and every one knows how brilliantly Field Marshal von Hindenburg translated this theory into action in his great and annihilating victories in the east.

Unfortunately, in view of the new linear strategy, this form of operation is feasible only under particularly favorable conditions. Where there are no flanks to be turned there is nothing for it but to attack the enemy frontally. We had never expected *that* in peace time. The voices—among others my own—which said that even break-through battles [1] were possible, and might become inevitable under modern conditions, were either ignored or not heard. As a matter of fact it was in that direction that matters developed.

In the trench warfare of to-day there are no flanks to envelop. Almost everywhere we find ourselves facing a long continuous front. The flank to be enveloped has first to be produced by an irruption into the enemy's lines, and the enemy stops at nothing to prevent such a breach

[1] *Durchbruchsschlachten.*

and close any gaps with reserves. Thus the frontal battle has become the inevitable and characteristic feature of mass warfare. To prepare for it and carry it out successfully is the great and vital—though extremely difficult—problem of the commander, a problem which both we and our opponents have often vainly endeavored to solve. The art of war has thus assumed a totally different aspect, for it is now a matter—at any rate in the opening stage—not of strategy but of concentrating and employing by surprise so large a force at a given point of the enemy's front that success is assured. As we shall see later, this is no simple task.

But if, as a result of mass armies, the frontal attack has become a permanent feature of operations, we must guard ourselves against the assumption that it must always be so. This view of the form of action must not become axiomatic. We can realize that by remembering the first battles of this war, not to mention the actions in Rumania or the last stage of the fighting in Russia. Indeed, this method of operation will become inevitable only where the enemy really succeeds in establishing a continuous front which cannot be enveloped at any point; such a front as the French from the

Swiss frontier to the North Sea, or the Italian from the Swiss frontier to the Adriatic. If the enemy cannot do so, former conditions will be reproduced and it will once more be a question primarily of strategical and tactical envelopment. There is even a definite relation between the size of the theater of war and the strength of the army to be employed in it.

The purely frontal action became inevitable in France because the Franco-British armies were large enough to hold a continuous front, and where any gap occurred close it again with reserves. In Russia, on the other hand, the same course was possible only within certain limits, because the front was too long in itself and became even longer as the theater of war extended eastwards with the successive enforced retirements of the armies of our enemy. The combined Russo-Rumanian armies managed to form some sort of continuous line from the mouth of the Danube along the Carpathians and northwards to the mouth of the Dvina, even though apparently they were without the necessary reserves. But when that line was once broken, geographical circumstances forced the hostile armies apart, and it was no longer possible for them to reëstablish a single front. The conditions of a war of movement

once more came into their own, and we saw how relatively weak German forces destroyed first the Rumanian and then the Russian army without their even being able to oppose a permanent and continuous front to their enemy.

This relation between mass and space must therefore always be borne in mind in considering war under modern conditions. Otherwise there is a danger of slipping into linear strategy without adequate reserves, a proceeding which contains the germ of defeat.

There are thus, broadly speaking, two forms of modern operations: trench warfare with the frontal "break-through" battle, and maneuver warfare, which always comes into its own where the defender, for geographical or numerical reasons, is unable to establish a front which cannot be enveloped, or, having originally had such a front, finds it sundered and broken through once and for all by the attacker. Yet it will always be the task of the commander to produce the conditions of maneuver warfare, as the chances of a decisive victory are far greater by this method than in a purely frontal battle. The result is that in the last resort the idea of envelopment must remain the dominant motive even in the strategic frontal action.

The first stage will be a constant endeavor to

envelop salients in the enemy's lines. But envelopment must also be the final goal of the frontal attack. The enemy's line must be broken through at some point, in order that the portions of the line adjacent to the point of irruption (which will then have become wings and unsecured flanks) may be enveloped and the process of rolling up the rest of the front which is stationary may be begun.

If the enemy, in spite of being defeated and thrown back, succeeds in closing the gaps and preserving the continuity of his line at the point of breach by throwing in reserves and thus preventing the adjacent parts of his front from being rolled up, the success of the attacker may be described as a serious tactical victory, but not as a decisive victory in the strategic sense. If, on the other hand, the attacker succeeds in getting at and enveloping the flanks of his opponent, then operating where possible against his communications, and finally rolling up the part of the enemy's front which still holds (either eccentrically or concentrically) he may expect a complete strategical and tactical victory.

As we can see, Schlieffen's principle of envelopment holds good for military operations under all circumstances. This has always been

so, however various the forms it has taken—whether the oblique order of battle of Epaminondas and Frederick the Great, Hannibal's double envelopment at Cannæ, Napoleon's break-through battle, or Hindenburg's encircling strategy at Tannenberg and in Masuria.

In modern war, indeed, it may often be brought about indirectly as the result of a break-through.

But the influence of masses on strategy is not exhausted with its effects on strategic operations and the area of the theater of war. It makes itself felt in all questions relating to the supply of the armies with food and war material.

As late as 1870–71 it was still possible to live mainly on the country, and supplies from home were, generally speaking, only supplementary to the supplies obtained on the spot. Of course in long sieges, such as the siege of Paris, the reverse was true, but this was an exception to the rule, and even on that occasion a good deal of food was contributed by the country itself. Every one who went through that siege will still have memories—rather disagreeable memories—of the French mutton which, with the solidified pea-soup sent from home, formed our daily ration.

Those conditions have entirely changed. Only very fertile regions are in a position to keep a modern mass army going for a short time. Once the war has passed over a particular district, or the army finds itself compelled to remain in one place for a considerable time, its requirements must be supplied from home and a complicated network of roads and railways, as well as an enormous amount of rolling stock, will be needed to solve the supply problem. The demands on the network of communications will be increased—as we shall see—by the demand for war material of the most various kinds, a demand which has grown to enormous proportions in comparison with former wars, and of itself imposes the heaviest burden on the lines of communication. The latter will further be subjected to an additional strain by the movements of the troops themselves.

In view of the enormous size of the modern theater of war and the masses which have to be moved backwards and forwards over great distances, it is impossible to carry out such movements on foot. Marching would mean relatively slow movement, which would be exposed to enemy reconnaissance in the highest degree. It is therefore absolutely necessary to carry out strategic movements of troops by rail if at all

feasible, and if possible to conceal what is going on from the knowledge of the enemy.

A developed road and railway system which would be equal to these requirements is certainly not to be found in any part of the world. It is thus essential to construct new railways and roads and keep them continually in order. This, however, means great swarms of labor troops, and these in turn increase the mass of the armies and the demands for food and other military supplies, while at the same time requiring a giant apparatus of administrative authorities and officials, so that the impedimenta of a modern army has become simply colossal, especially considering all the troops which are required, particularly in enemy country, to guard the lines of communication.

The movements of the army itself are made extraordinarily difficult by all these complications. An amazing apparatus, which is systematized down to the last detail, is required to carry out the strategic movement, concentration and diversion of a single army group.

In all these questions there is a further obstructive element in the influence which the mass levy has had, and was bound to have, on the tactical value of the troops themselves. The more new formations of recruits and older

classes of men with previous military training there are, the lower must be the percentage of active[2] N.C.O.'s and men among them and the smaller the number of active officers with the individual units. Their places are taken by reserve and Landwehr officers and N.C.O.'s, and with the best will in the world these elements, owing to their inferior technical training and less experience, never make so solid a framework for the unit or lead it so well in battle as men to whom soldiering is their life-work. Further, as such units consist of men some of whom are recruits with a very short training, while others are older men who have left the military profession for a considerable time, it is only natural that their tactical value cannot be equal to that of regular regiments which are mobilized in the normal way.

If the war lasts for a long time and the men of the peace establishment gradually disappear as the result of death and wounds, the tactical level of all regiments, regular as well as new formations, tends gradually to become the same and the old regular units have only one advantage, though it is certainly an advantage of great importance for the tactical efficiency of a unit. It is tradition and the spirit which ani-

[2] As opposed to reserve. (Tr.)

mated the men of the peace establishment. The latter cannot easily be replaced in units which are new formations because these do not get the men from home who are the representatives and heirs of that spirit. It is only very gradually that this defect can be made good in the course of a long war and only after a series of glorious achievements has created a tradition, though a new one, of its own which gives birth to an *esprit de corps* which will tolerate nothing weak or unworthy.

In the same way the corps of officers which does not consist of professional officers can only gradually attain the highest standard of efficiency as the result of war experience and will seldom reach that standard, as death in battle is ever tearing bloody gaps in the ranks and usually carries off the best and most capable officers, those who wish to set their subordinates a brilliant example and therefore freely expose themselves to the bullets of the enemy. The same is true of the N.C.O.'s, who, in ordinary circumstances, are the sheet-anchor of the unit. We must further remember that by the calling-up in mass of all men who are in any degree physically fit, morally inferior elements get into the army, elements which degenerate still more under the influence of war and fre-

quently have the most harmful influence upon their weaker comrades.

Finally, it is inevitable that the standard of physical efficiency among the older classes should be lower than that of young healthy men. They also lack the energy and enthusiasm of youth, although, on the other hand, they are often less excitable and more reliable. Yet, notwithstanding these advantages, the value of a unit for general purposes can be very materially reduced by a heavy percentage of older men. Units which consist of practically nothing but these older men can, in general, be employed on a few special war services only.

Thus the commander of a modern army has to struggle with the greatest difficulties, even in employing his troops on the various tasks which face him. On the one hand, special units only, as a rule, can be employed for special purposes and on the other, war service and intensified training have to go hand in hand in order that the drafts (which arrive not always fully trained) may be familiarized with their fighting tasks and welded with the field troops into a tactical whole. This is particularly true of a long war where an exhausted unit has to be brought up to strength again time after time.

Hence the remarkable fact, never before ob-

served to the same degree, that the theater of war is not only a battlefield but simultaneously a maneuvering ground on which efforts are continuously being made to solve the changing problems of modern war—trench and open warfare, defensive and offensive tactics.

This is all the more necessary as with the progressive improvement in arms and war material—a phenomenon which was continuous in the World War—greater and greater demands have to be made on the tactical efficiency of the troops. Let us now turn our attention to this aspect of the matter.

II.—Military Technics

In all the novelties in the department of military mechanics, the multiplication and improvement of weapons form the starting-point for all changes in tactics, while these in turn frequently have a decisive influence on maneuver and strategy. Other discoveries have, of course, had a vital influence on the art of war in many respects. We shall naturally have to deal with them also. But their influence has not been as far-reaching as that of modern fire effect. The latter has become an absolutely determining factor in a modern action.

It is, therefore, of great interest to inquire

not only how these new effects make themselves felt, but also how effect and counter-effect have conditioned and intensified one another, for it is only by the study of their mutual relation that any inference can be drawn as to future developments. Yet that is always the vital problem in the science of war. It is only when we have solved it successfully, even to a limited degree, that we are secure against surprises from some opponent who has been more farsighted, or be in a position to face subsequent decisions with confidence.

As I have said, even before the war, the steps to a sound development had been taken in our army. The logical inferences, however, had not been drawn. In many respects we were behind requirements, in others we had started from false premises, while in some directions the course of development was open to dispute.

We very distinctly overestimated the effects of artillery fire, and thus believed that we should not require more than a limited number of batteries. I, myself, fell into that error. On the other side, we underestimated the defensive power of modern quick-firing weapons, and thus had not shown sufficient energy in increasing them. We had certainly made a beginning with the introduction of heavy artillery as well as

the machine gun for the field army, thus setting our feet upon a promising path. But, as I shall show only too soon, we did not go anything like far enough in these directions.

Heavy, flat-trajectory fire had been very much neglected in peace. We had not realized its great importance. We were hopelessly wrong in our calculations of ammunition requirements, and this led to serious crises more than once.

Our cavalry was trained on thoroughly wrong principles. Battles of position had frequently been seen in the Russo-Turkish and still more the Russo-Japanese War, and had revealed how important such operations might be in certain circumstances. Actions for the possession of fortified positions had been the subject of discussion and maneuvers with us in Germany. But they had been considered only in connection with strategic movements, and temporary field fortifications alone had been contemplated. No one had ever thought of genuine frontal trench warfare. The few mortars, heavy field howitzers and 10 cm. and 13 cm. guns which the army had were considered enough for field operations, and heavier and the heaviest guns were provided for use against enemy fortresses only with a view to enabling us to smash through the ring of forts as soon as possible. Yet

even that meant a great step in the right direction, as it secured us a great superiority over our enemies at the outset. But this certainly does not mean that the importance of artillery for the coming war was fully appreciated. It was the events of the war itself which first brought it home to us.

The result was that we entered upon the war with views and systems which were to a certain extent imperfect and had not been thoroughly thought out. The means and resources at our disposal were the logical outcome of them. Just as we had failed to realize what masses of men the war would require, and thus had to improvise them after it began, we soon found ourselves far short of requirements in the matter of armament, just because our ideas of the effect of modern weapons did not correspond altogether to reality. In our first victorious battles our infantry suffered very heavy losses which swept away the flower of our youth, while our cavalry was sacrificed in futile attacks, to some extent against obstacles, because their wholly erroneous peace training had been devoted practically exclusively to this form of operation. All this has already been discussed.[3]

When our front extended more and more

[3] See Introduction, p. xv.

after the battle of the Marne and we were compelled to defend ourselves against hostile mass attacks in long, thin lines, we found ourselves under the necessity of digging in, in order to escape the destructive effects of the enemy's fire and keep down our losses, thus increasing our power of resistance. Efforts were also made to protect the troops against the enemy's fire by the provision of steel helmets and the construction of armored shelters. All this made the task of the attacker more difficult, especially as before long the defender found means to intensify his own fire by an increased use of machine-guns. The attacker now saw himself compelled to take countermeasures. Infantry rushes against an entrenched defender were seen to be anything but hopeful, because they produced heavier losses than an attack in open warfare. Measures had to be thought out for keeping down the fire of the defender.

For that purpose machine-guns alone were inadequate in an attack. The natural result was the increase and improvement of the artillery. The enemy's trenches and obstacles had to be destroyed, his infantry kept underground, his artillery fought down and if possible silenced, if the way for the attack was to be prepared.

Further, flat-trajectory field-guns had to be replaced in ever increasing measure by high-angle fire if the enemy was to be reached when behind cover.

The defender, however, immediately replied by strengthening his trenches with shell-proof, concrete dug-outs, then by increasing his artillery which was assigned the task of not only engaging the attacker's artillery but directing an annihilating fire at the enemy's avenues of approach, his assembly trenches and concentration points, and by sweeping the area immediately before the defender's trenches, laying a curtain of fire in front of its own infantry, a curtain which the enemy could penetrate only at the cost of the heaviest losses. (The barrage.)

The attacker on his side now saw himself compelled to assign further tasks to his artillery. His problem was not merely to destroy the enemy's defense works and get his infantry under a destructive fire. He had to neutralize the defender's artillery also, completely, if possible, in the hope of preventing its disastrous effects on his own artillery and particularly his infantry.

Finally, hostile aircraft had to be fought from the earth also, and it was found that artillery

was indispensable even in really mountainous regions. Thus both the number and types of guns had to be increased, and adequate supplies of ammunition had to be furnished for them. This again had its effect on the defender, and thus this arm acquired a growing importance for both sides. The most varied types of guns were introduced for the various purposes, and supplied with correspondingly varied natures of ammunition.

It has already been said that the enemy's concrete dug-outs and fortified trench-systems had made a great increase of high-angle fire necessary, from the lightest up to the heaviest calibers. In addition it was shown to be necessary to destroy or damage the enemy's roads and cantonments, depots and important industrial establishments, neutralize or silence his artillery at long range and sweep extensive areas with flanking fire, if possible with the widespreading cone of shrapnel. Thus the field-piece remained a useful weapon, though it was replaced by a weapon of longer range. Side by side with it developed the construction of long-range high-angle fire batteries, and heavier flat-trajectory batteries of even longer range. The development attained an importance which had not altogether been foreseen,

and finally culminated in the construction of the gun with which we bombarded Paris from a distance of about 120 kilometers.

Apart from this special achievement, guns were constructed the great majority of which were not above 15 cm. caliber, though there were calibers up to 38 cm. Some were supplied with motor transport, while others were made mobile by rails so that they could be fought as railway guns without being removed from the rails.

For defense against aircraft guns were constructed with elevations up to 85 degrees. Some of these were on a fixed base, while others were mounted on motor-lorries and were thus mobile. Lastly, mountain artillery, such as had not been seen before the World War, was produced for special purposes. In the Carpathians and the Alps, where German troops also fought and conquered, it was absolutely necessary to supply the men with artillery which they could take with them anywhere. This purpose was achieved by the construction of a special type.

But though ample provision was made for long-range fire by all these measures, it also proved necessary to obtain effects at the shortest distances from our own lines—particularly in trench warfare—effects which were equal to

those of artillery, without diverting that arm from its proper task (firing at distant targets and doing all the damage possible to the enemy troops and particularly to his artillery) for the sake of dealing with targets close at hand.

This purpose was served by the trench-mortar, which was placed in or immediately behind the forward infantry lines and assigned the task of taking the nearest enemy trenches under annihilating fire. Here again various calibers were constructed, and trench mortars were divided into heavy, medium and light, according to their effect and mobility. The latter were such as to accompany the infantry even in an attack and could also be employed as flat-trajectory guns at short ranges when the infantry in the course of their advance came up against targets with which they were unable to deal with their own weapons.

The same necessity gave rise to the batteries of infantry-guns which were light, flat-trajectory field-pieces. Their task was to accompany the infantry closely and destroy hostile strong points by direct fire, whereas the light trench-mortar could perform that duty at ranges of 800 to 1,000 meters at the outside, though it could also be employed as a high-angle weapon, as we have observed. Even the medium trench-

mortar, which had a very violent detonating and explosive effect, could be made mobile and used against targets which were difficult to deal with. The heavy trench-mortar, on the other hand, was principally for use against fortified works and had to be firmly built in.

To strengthen the defense against hostile attacks on trench lines recourse was finally had to trench-guns, quick-firing weapons of 3.7 cm. up to 5 cm. caliber, which had a considerable effect at short range owing to their high rate of fire.

When we turn to the question of gun ammunition, high explosive has recovered its importance as compared with shrapnel even against isolated living targets, partly because of its greater moral effect, partly because it is more easily and rapidly served, and further because mass production in war-time failed to produce time-fuses so reliable that accurate settings were possible. This was owing to the shortage of many kinds of raw material. High-angle fire is primarily required against targets in shell-proof emplacements or "blind" targets. It is true that time-fuse ammunition was also produced for this purpose because the burst is not only forwards but also backwards and downwards, but in general its use was impossible for the same reason as that of shrapnel, i. e.,

the difficulty in war-time of producing reliable fuses in large numbers. Thus, generally speaking, we relied on the tried high-explosive shell, which was also easy to handle. The fuses, however, were delay-action fuses, so that the shell did not burst until it had penetrated the target. Others were extremely sensitive, so that the burst occurred the moment the shell came into contact with the target, thus increasing lateral fragmentation. Shells with hardened caps were used also against targets with a high power of resistance. Finally, certain special natures were produced for exceptionally long-range work (stream-line and false cap shell).

In this book, which deals only with broad outlines, there is no need to discuss minute points of gun construction, which are mainly of technical importance. On the other hand, in speaking of artillery we must not omit to mention a new weapon, gas, which attained great importance especially as associated with artillery. Poisonous gases and irritants of various composition were first used as an independent weapon during the war. Such gases were originally condensed in steel cylinders. The latter were placed in position in the trenches, and when the wind was favorable the gas was released

towards the enemy, upon whom it had a terrible effect—if he was taken by surprise.

In the long run, however, this system proved impracticable. It depended too much upon the wind, which in certain circumstances might blow back the gas into our own lines. Our troops were also exposed to danger when the hostile artillery destroyed the gas cylinders. All the same, considerable successes were obtained by this method so long as the enemy was not prepared against this weapon. Finally, however, the disadvantages outweighed the advantages, and we therefore proceeded to produce artillery and trench-mortar gas shell.

This had the advantage that we were less dependent upon the wind than hitherto, as the point of impact of the shell could be arranged behind or at the side of the target—according to the wind—and even if the wind direction was unfavorable there was far less danger to our own men than when the gas was released from our own lines. Moreover, we could now gas or infect troops and areas far behind the enemy's front, and this was particularly important, seeing that the hostile artillery was always a long way back.

The gases produced effects according to their nature, either by irritating the respiratory or-

gans, nose and eyes, and thus putting the victim *hors de combat* for a certain time, or by causing death on inhalation, or by infecting a whole area which had been heavily gassed for a considerable period so that no one could enter it with impunity for several days. Such gases are not only frequently fatal on inhalation but have a deleterious effect on the skin with which they come in contact and also produce blindness, while the effect of the first-mentioned gases is certainly injurious from a long distance, but the effect does not last long.

Gas masks have now been introduced universally as a defense against gas. They absorb the dangerous elements on inhalation and thus render it harmless. Of course they are not a protection against all gases, and if worn for a long time on end they prevent both the hostile infantry and artillery from taking very much part in the action.

A form of warfare which is related to gas though quite different in its effects is the use of smoke shells and bombs. They do the enemy no direct harm but often effectively hinder him from using his own weapons. In particular, they conceal the attacker's movements from the eyes of the enemy so that it is possible to approach his lines under cover, so to speak, and

thus the factor of surprise is much increased. Of course, it frequently hinders the attacker's own movements also, as it is not always easy to keep direction or indeed use his own weapons in an area shrouded in smoke.

In addition to the far-reaching changes in the composition and range of action of the artillery, shooting itself has also undergone very material modifications. Before the World War we were, generally speaking, restricted to ground observation and this is the case to-day, at any rate in open warfare. Good observation posts have become much more important. But in view of the immense range of modern guns, ground observation is certainly not possible in all cases, and, generally speaking, is limited to actions at close quarters. The artillery also makes the fullest possible use of cover to escape observation. Distant targets can thus usually defy direct observation. In such cases the latter is replaced by observation from the air, captive balloons or artillery aeroplanes which report by wireless or telephone the position of the shots from the battery in action, so that correction is possible.

Even this system is not always feasible, partly owing to the action of hostile aircraft and also because it is very difficult to pick out

individual shots when a number of batteries are in action close together. It thus becomes necessary to fire at a target with some prospect of success even without direct observation. This aim has been achieved by the use of various types of range-finders. In the first place the emplacement of the battery which is to fire is fixed trigonometrically, the survey posts are established, also by trigonometry, at various points in the neighborhood. From these points bearings are obtained at various angles upon the flashes from the enemy guns and thus the emplacement of the battery in action is established (flash-spotting). In other cases the position of the hostile battery is determined by calculating the time which the sound waves take from the moment of firing to reach the ranging posts. These calculations enable the position of the batteries firing to be determined quite accurately (sound-ranging). By this method it is also possible to determine the fall of the shots from one's own batteries by the reports of their bursts, and thus fix them on the map. By continuing the process they will be corrected to the target. In flash-spotting, on the other hand, bearings are taken if possible on the smoke of the bursts, the point of impact determined accordingly and the corrections made.

Where the area in which the shells are falling cannot be seen from the survey posts, the fall of the shots can be determined with the help of the altimeter system in which a shot is fired intentionally with a very high time-fuse burst. From this the prospective point of impact of the shell if it had completed its trajectory is a matter of calculation. Corrections are made accordingly.

When observations of the shell-bursts are impossible from the ground or in any other way, we have to fall back on shooting without observation altogether, but this is always exceptional. The conditions precedent to any measure of success are accurate knowledge of one's own position and that of the target, good maps and attention to the atmospheric "errors of the day" as well as the "special errors" which influence the trajectory of the shell. In these circumstances our whole ranging and map system has reached a high degree of development. The army meteorological service had also been very useful.

The direction and strength of the wind, the humidity of the atmosphere, air pressure and other factors influence the trajectory of the shell to a very considerable degree. In shooting it is essential to take these "errors of the

day" into account. Meteorological observation posts are therefore established which note these atmospheric influences every day and report them to the batteries, so that these are in a position to take the influence of these various factors into consideration in practical shooting (which is put in tabular form). In this way accuracy in shooting has been very greatly increased.

There are, however, other special "errors" which vary with the individual gun, and are due essentially to the different degrees of wear and tear. These special errors are determined at intervals by firing every single gun at a given range, so that the sighting for each piece is worked out for all ranges (the Pulkowsky system). This certainly makes shooting rather more difficult, but results in a considerably higher degree of accuracy for the whole battery.

We have seen that the fire-power of the defending infantry and the fact that they have to hold a long and fortified trench system gave the first impetus to an extraordinary increase in the amount of artillery, and in the course of the war to the introduction of the most varied types of guns and a complicated system of shooting. We shall now see that the infantry itself witnessed far-reaching changes in its own

weapons and thus in the whole sphere of tactics.

Before the war the high rate of fire, range, trajectory and accuracy of the modern infantry rifle, which promised annihilating effects at short range, justified the supposition that fighting would mainly be at long range and that the attacking infantry would only gradually succeed in acquiring a superiority of fire and getting within storming distance of the defender. Our whole system of tactics was based on that assumption, and the first actions in the World War certainly took that form. We may also assume that, in future also, similar conditions will lead to similar actions in the case of encounter battles in open warfare.

But conditions changed completely when trench warfare began. The two opponents now came extremely near to each other, and the business of both attacker and defender was either to get at the enemy, who was protected by his trenches and wholly or partially invisible, or from the shelter of their own trenches to keep the enemy under fire when he stormed forward across the narrow space between, and this without exposing themselves too openly to the enemy's fire. At first we had snipers armed with a rifle with telescopic sights who, from the cover of an armored shield, could hit even the small-

est targets. Next the hand grenade was introduced, a weapon which was in use even before Frederickian times, and had been employed systematically in the Russo-Japanese War. It was now the principal infantry weapon at close quarters, as it was absolutely indispensable when working round the traverses which protected the trenches against enfilading fire. It was equally necessary for surprise attacks on isolated posts and strong points.

This, however, does not conclude the chapter on changes in infantry armament. The more enemies entered the field against us Germans—Italians, Rumanians, the newly-formed English national army, Asiatics, Africans, and finally Americans—and the more our losses accumulated in countless battles and actions, the more urgent did it become for us in defending our long battle-line to economize reserves in order to be able to bring them up to threatened points. This, and the requirement of concentrating our own fire-power in the attack, brought home to us—and by reaction to our enemies, who wanted to annihilate us by sheer force of numbers—the necessity of increasing the fire-power of the infantry while at the same time exposing as few men as possible to the enemy's fire in the front-line trenches in order to minimize losses.

These apparently contradictory demands were met by the introduction of the light machine-gun, which gradually became the principal infantry weapon and, as we shall see, has an immense influence upon its tactics. This light gun, which could be carried by one man, was equivalent to the fire of a whole platoon equipped with infantry rifles, and therefore enabled us to hold our front lines with a relatively small number of men both in attack and defense, and so economize reserves. This satisfied our requirements. Even though it was necessary that the gun should be accompanied by a number of ammunition carriers, the total number of men employed was far less than would have been the case if the same fire-power had to be obtained by rifle fire alone.

The heavy machine-gun, to which was assigned the task of firing at the enemy from dominating or flanking positions as well as from long range, was of course retained and to-day it forms—through its indirect fire also—a material support for the infantry, especially in the defense. Further help in the defense was given by the stick-bomb thrower, which was useful for intensifying the barrage, and by the rifle grenade, which is certainly rather a primitive weapon.

Yet it soon appeared that it was necessary to intensify the power of the infantry, especially in the attack, after this problem had been solved as regards defense by the introduction of trench guns and mortars.

Realizing this fact and taught by experience that the advanced trench system could be so overwhelmed by the attacker's artillery and trench-mortars that it would be quite impossible to keep the defender's infantry in a position to resist, the latter proceeded to convert the whole area behind the front lines into a deep, defensive zone. There were not only several lines and positions one behind the other, but in the intervals between them, strong points and machine-gun nests were established, if possible, on a chessboard pattern, most of which would be hard for the hostile artillery to find and which would keep holding up the enemy as he advanced. Thus the attacking infantry, even when they had captured the front lines, would find themselves continually being faced with fresh obstacles with which they could not deal with their own resources. Yet their own artillery, which was a long way back, could not always give them effective support, owing to the confusion of the action and the distribution of the strong points. The attacking infantry would

still have some in front of them while others would have been passed or left behind.

In such circumstances observation and accurate shooting from the usual emplacements of the artillery is not always possible. The artillery cannot follow the successive phases of the infantry action very closely, and so cannot intervene at the decisive point soon enough. It is, therefore, necessary that the attacking infantry should have the appropriate weapon with them. They must thus be supplied with artillery escorts—light field batteries and batteries of "infantry" guns of similar construction—and very mobile portable trench-mortars which will be able to settle the hostile centers of resistance with the help of ground observation and direct fire. For the same purpose the infantry is now equipped with flame-throwers which shoot a mass of flaming liquid at the enemy and thus annihilate him, though, of course, only at short ranges.

But even these measures did not seem to strengthen the attack enough to make it certain of getting right through. Automobiles were therefore constructed, our enemies being first in the field in this department, which were armored cars completely closed in and armed with machine-guns and quick-firing guns.

These were the so-called tanks, which were fitted with very strong petrol engines and, being proof against infantry fire, were sent forward against the defender's lines with a view to opening a road for the infantry following up behind. They were constructed in such a way that they smashed through obstacles, climbed over trenches and artificial cover quite easily, and brought an overwhelming enfilading fire to bear upon the enemy's broken lines.

This tank, which was somewhat clumsy and rather slow at first, was gradually improved very materially, and to-day must be regarded as the principal weapon in the armory of the Entente. At the moment it is quite impossible to say where this development will lead and whether the tanks will permanently prove their value. However that may be, they were constructed in thousands by our enemies and at first gained great successes by surprise.

They were of the most varied types. The original type of clumsy and slow-moving tank was subsequently used only for transporting ammunition and other material into the front lines. The real battle tanks, on the other hand, were constructed in practically two types, the heavy battle tank and a lighter and faster tank which was commissioned to rush forward into

the enemy lines as fast as possible and cause a panic on the lines of communication. Further, there were yet larger tanks, which were not for fighting only but designed to carry a considerable number of men and machine-guns which could be deposited behind the enemy lines when these had been broken through, so that they could take the defenders in the rear.

Tanks were divided into male, female, and hybrid tanks according to their armament. The males were those which had two quick-firing guns in addition to machine-guns, females those which had machine-guns only, while the hybrids had machine guns and only one quick-firing gun. Taking them all round, these armored cars are a weapon which must not be underestimated. They may, however, be perhaps compared with the elephants which Pyrrhus originally brought into the field against the Romans. He sent them out in front of his infantry and at first they produced an immense military and moral effect upon his enemy. Before long, however, the surprised Romans found the right antidote, and the elephant attack failed before their intelligent courage.

Similar armored cars were constructed in Germany also, and they must certainly be re-

garded as in no way inferior to those of the enemy.

These contributions to the armory of the attack naturally led to counter-measures on the part of the defense. Infantry ammunition was produced which could pierce the armor of the tanks. Special anti-tank guns were introduced for the purpose of achieving that object with greater certainty. Special guns were placed in the defensive zone for the purpose of fighting tanks. They were supplied with armor-piercing shell and assigned the task of destroying the advancing tanks by direct hits at close range. Narrow passages which the tanks had to pass through were fitted with concrete slabs which the dreaded war-machine could not get past (especially in the back areas). Lastly, the defenses, known as "tank-traps," were constructed in such a way that it was very difficult for the tanks to climb over them. We thus succeeded in paralyzing the influence of this war-machine to a very material degree. We captured or destroyed large numbers of them. All the same, when properly employed, they were a useful weapon.

But though the arming of the infantry, and more particularly the artillery, with the new weapons assigned to these two principal arms

has settled the form of conducting a modern action and determined the character of the decisive battle, there are other discoveries in the realm of armament which have in many respects a very vital influence. Aviation must be given the place of honor here.

Even before the war a decided beginning had been made with the development of the air arm. Dirigible airships had already reached a stage approaching perfection. The captive balloon was certainly not appreciated as it should be, but aviation, the growing importance of which was certainly not fully realized, was undoubtedly making gratifying progress though it was still in its infancy. This all changed very quickly when the war began. The captive balloon recovered its place of honor as an observaation post both in trench and open warfare, and before long aircraft attained high strategical and tactical importance with which the construction of the machines themselves kept pace, while that of dirigibles, which had still played a certain part at the beginning, became more and more secondary as we succeeded in constructing aëroplanes with a great radius of action and an increased carrying capacity.

To-day this problem has been completely solved. The following types are now distin-

guished: reconnoitering squadrons, bombing squadrons, battle and pursuit flights, all of which have their special tasks to perform either individually or in regular tactical units—the necessity of which I had already emphasized in my book, *Modern War.*

The principal task of the reconnoitering squadrons is to photograph the hostile lines and find out what the enemy is doing far behind his front. Aëroplane photography has reached a very advanced stage of development. Photographic work can also be done from captive balloons. Thus air reconnaissance, especially for strategical and tactical distant reconnaissance, is a substitute for cavalry which in the nature of things has no place in trench warfare and in open warfare receives very material assistance from air reconnaissance. Air craft are also responsible for close reconnaissance, where they work with infantry patrols, while this duty falls exclusively to the infantry in trench warfare.

Another duty of reconnoitering planes is to assist the artillery to find their targets by spotting and reporting the bursts. They also keep the front infantry lines in touch with their command posts in the rear. In certain conditions they are able to carry ammunition and food to

infantry in action (infantry flights). In order to keep in touch with the troops, the machines, especially the artillery machines, are fitted with wireless telegraphic and telephonic apparatus while the troops are supplied with a similar apparatus.

The bombing squadrons consist of machines with very great carrying capacity so that bombs up to 1,000 kg. can be carried. There are large bombers and giant bombers, the latter being the largest of all. They carry bombs and their function is to attack hostile billets, supply dumps, railways, hangars and important industrial establishments from the air. The effect of their bombs is sometimes very extraordinary. They may have very sensitive or delay-action fuses according to whether their purpose is to obtain a great, low and wide lateral burst or smash through a target offering much resistance. On special occasions bombing squadrons were accompanied by smaller machines, to which were assigned such tasks as attacking trains, for which purpose they had to dive down over the target in order to hit and destroy it with the so-called aëroplane "mines."

The battle flights, on the other hand, were deputed to intervene directly in the battle of the other arms going on below. The pursuit flight

had the duty of protecting the other categories when at their work, to attack hostile machines wherever found and fight for the mastery of the air. They were constructed specially for that purpose and were therefore particularly fast and handy.

All aëroplanes are armed, some in front for offensive purposes, others in such a way as to be able to beat off hostile attack from the air. The reconnaissance, battle and bombing machines each have one fixed and one mobile machine-gun. The armored infantry planes, which are thus as safe against rifle and machine-gun fire as it is possible to make them, form an exception. At first they had a pair of coupled machine-guns in the floor of the observer's seat, these for shooting vertically downwards, in addition to a mobile machine-gun for the observer. Subsequently, the coupled machine-guns proved unsuitable and were replaced by a single one. Finally the pursuit machines were armed with two fixed machine-guns.

In addition to their special functions all aircraft were used for purposes of signaling and communication, whether by wireless messages to the headquarters or units (e. g., batteries) or by dropping smoke indicators—which can be seen from a great distance—which contained

messages in a special case. Carrier pigeons could also be sent out from aëroplanes.

The air arm with its many functions thus represents an extremely important discovery for all armies, and seems destined to exercise an influence which will be decisive in many respects on the development of strategy and tactics. Even the question of fortresses will be affected by it—as I prophesied before the war.

It has already given a very important proof of its influence on strategy in the fact that we are now compelled to carry out all strategic and operative movements at night, in order to conceal them from aërial observation. It has also led to numerous camouflage measures in order to make battery emplacements, defenses and so on unrecognizable by enemy airmen.

The mechanical side of war has had a vital influence in another very important department —the intelligence and signal service—and for the first time made possible the control and command of modern mass armies in theaters of war as large as those the World War has seen.

The usual Morse telegraph system, which is still employed for minor telegraphic communication (and for long after 1870–71 formed the only means of communication between the different armies and units), has otherwise completely

vanished from the army. The telephone is the ordinary means of communication between the different units of the army and between the army and home. It is the indispensable means of communication between the division and all its subordinate units, and where necessary, conversation is in code so that if the enemy overhears it no harm is done. Between the division and the corps the so-called "tapper" is in use, a device which enables six hundred words an hour to be transmitted. It is a telegraphic apparatus which gives taps corresponding to the Morse code, and these are heard by the receiving station.

Between the corps, army and army group headquarters the telegraph is used, which, thanks to a clever American invention, is able to transmit one thousand words in writing per hour, so that the receiving station gets the communication in the form of a written telegram which no one else can read. Between the group headquarters and general headquarters, as well as between the latter, the central authorities at home and other theaters of war—possibly very far away—the Siemens high-speed telegraph is employed, a system which transmits five thousand words an hour, the receiving station again getting the communication in the form of a

written telegram. The apparatus required is fixed, and specially-sprung rolling stock is necessary when it has to be moved.

To such extraordinary heights and perfection has ordinary telegraphy attained.

Side by side with it wireless telegraphy is also in current use in the army. According to the apparatus employed, it permits communication one or both ways. In the first case, messages can only be received; in the other, both received and transmitted. A wireless detachment is assigned to every division, and with its help the latter can keep in touch with its subordinate organizations, brigade, regimental and battalion headquarters, as well as artillery command posts. It is advisable, however, to impose certain restrictions on its use, as otherwise the individual exchanges get out of order very easily. For instance, artillery aëroplanes should have transmitting apparatus only when they are spotting for the artillery; the batteries concerned should have only a receiving apparatus.

The larger units also are in wireless communication with each other.

The divisional wireless detachments are given power-buzzers, which, by using the conductivity of the earth, establish wireless communication

without any special apparatus being necessary. The earth itself transmits the communication. The installation, which is a very simple affair, can be used both for transmitting and receiving. An amplifier valve makes it possible for the human ear to catch even comparatively weak currents which pass through the ground. The same principle is utilized for the listening set stations, which enable the occupants in certain circumstances to listen to the enemy's conversation by telegraph or telephone, because the electric currents which the enemy is using, and which are to a certain extent running at large through the ground, may be caught up in the receiving apparatus.

In addition to these electrical hearing and communication systems, lamp signaling is still resorted to. Powerful electric lamps flash signals which correspond to the Morse code from the front to the rear, and vice versa. They are generally used by the division, and put it in communication with all parts of the line down to companies in the front line, trenches and artillery observation posts. According to the power of the lamp and its corresponding range, the apparatus is classified as large, medium and small. Unfortunately, its radius of action is very limited in wet or foggy weather.

Where all these resources fail, messenger dogs and carrier pigeons are employed and supplied to the troops. The pigeons return to their homing lofts very quickly and the messages they carry are then sent on by telephone. Carrier pigeons have often done very good work where all other means of communication failed. Generally speaking, they were particularly reliable.

Message shells can also be used in appropriate circumstances. Specially constructed projectiles were fired from trench-mortars (light) or bomb-throwers in the front line to a receiving station behind; on impact they burst open, giving off a good deal of smoke, and thus deliver the message which is contained in a special case. Finally, signals which have previously been agreed upon can be given by light-balls of various colors and shapes—demands for artillery fire at a certain spot; lengthening or shortening the range, etc. Further, sound signals, sirens and similar devices which carry a long way can be used as alarm signals, for example, or to convey some message which has been agreed upon beforehand.

These communication systems, every detail of which has been thought out, make it possible, generally speaking, to get safe and compara-

tively reliable communication between the various headquarters in the rear and the troops in the line, even during the most violent artillery drum-fire. On the other side, they assure certain communication between headquarters which are separated by immense distances. For example, the Siemens high-speed telegraph insured rapid communication between Berlin and Constantinople.

Apart from rapid communication between the central organization and the individual units of the mass army, the latter itself has to be made as mobile as possible. I have already referred to the importance of railways and roads in this connection. After the rapid reconstruction of the main lines and their subsequent extension in the theater of war, field railways, which are quickly laid, are an indispensable aid to the transport of modern armies to-day. However, seeing that such a railway network cannot be made movable, but is always more or less a fixture, some extension had to be found which could not be supplied by horse-transport alone.

This gap was filled by the automobile, both motor-cars and lorries, which materially facilitated and, indeed, alone made possible the supply of the army, at any rate, in regions where

good roads were to be found. This invention has made it possible to convey considerable loads in relatively few vehicles, thus shortening the columns, to expedite transport very materially, and lastly—in theaters where there is a large network of good roads—to economize horses, which are thus to a great extent released for roadless regions where the use of heavy motor transport is impossible.

Motor transport is put to special uses in connection with artillery. It is employed very largely for bringing up ammunition and also used for moving heavy guns. Such guns are also mounted on motor lorries, which then serve the double function of emplacement and means of locomotion. Motors are, moreover, very useful for accelerating the removal of the wounded and for taking superior officers on long journeys. Thus, in their different forms and methods of employment, they are a very considerable help in conducting the operations and movements of a modern army. In an emergency whole units can be transferred from one part of the front to another by mechanical transport. Our enemies in the West frequently made use of this system. Indeed, it is worth considering whether it would not be possible to make much

greater use of petrol vehicles for moving artillery, perhaps even on the battlefield.

We have already seen how the tanks were used in an advance.

CHAPTER II

TACTICS

It is obvious that a revolution in the military art such as the Great War witnessed must also have had an enormous influence on the manner in which the different arms were employed. The introduction of new weapons changed the form of operations completely; on the other hand, the fact that the relation between the size of the armies and the area of the theater of war inevitably involved new methods in the conduct of those operations (as I have already shown), and the further fact that the very variety of armament and the different standards of training which the mass levy made inevitable had the same effect, introduced a factor of uncertainty into fighting which must always be borne in mind if military action is to be effective.

Thus, before we can get a proper idea of modern tactics, we must first ascertain what influence all the discoveries of the World War have had on the movement and employment

of the individual arms. Only thus will it be possible to formulate tactical principles which will be able to lay some claim to universality. In many directions this has already been done.

In so doing it is essential to start with the infantry, even though the rôle of the artillery has become much more important in modern times. The infantry is undoubtedly the arm which by its attack makes victory tangible, even though the way was paved by its sister arms, and gives practical expression to it by gaining ground or taking a large number of prisoners. It is the infantry again to which the strategic exploitation of tactical successes is mainly assigned. We must therefore give the place of honor to the influence which the new discoveries of the war have had upon it.

I.—Infantry

The idea that the infantry action would begin at long range and only gradually lead to fighting at close quarters has now proved erroneous, for the stronger the artillery became in comparison with the infantry and the weaker the latter became (at any rate in Germany), owing to the losses incurred in years of fighting, the greater was the prominence which the action at close quarters attained. The attack presup-

poses numerical superiority in both arms and moral superiority at any rate in the infantry. In this way—as we saw—the attacker's artillery is in a position to keep down the hostile artillery, while at the same time coöperating with the trench-mortars in so pinning the defender's infantry down to their cover that they can make no use of their weapons during the artillery preparation, and will not be able to do so until the attacker's artillery "lifts" to allow his infantry to go forward. The latter, under the protection of their superior artillery, presses on against the enemy without suffering too heavy losses, but can itself make effective use of its weapons only when the defender's infantry appears behind its cover in order to fire. Thus the infantry action generally begins at very close quarters.

Yet this certainly does not mean that the process may not often take a different form. When there is no definite superiority on one side, for whatever reason, and particularly in open warfare, the character of the infantry action will probably change, and it seems quite possible that the fighting in these circumstances would again begin at long range and victory would be brought by some means other than a superior artillery. One method of making a

successful frontal attack without such a superiority has already been tried.

Our enemies have repeatedly attempted to enable their infantry to get forward, without the necessity of silencing the defender's artillery as a preliminary, by making their attacks as great a surprise as possible. Several "waves" of tanks, following closely on each other, covered the advance of the infantry and tried to claim the defender's attention so completely and draw his fire so effectively that it would be possible for the attacking infantry, under the protection of these armored vehicles, not only to get to close quarters with their opponents but to break through their lines and roll them up. The attack was also frequently shrouded in artificial fog to conceal it from the enemy. This method gained our enemies several important successes, and in turn demanded new counter-measures appropriate to the circumstances.

Infantry methods were also affected by the fact that the machine-gun has become its principal weapon. The requirements of defense first led to an increase in the number of heavy machine-guns, and then—in order to get on level terms with the attacker again—to the introduction of the light machine-gun, which en-

abled a really great fire-power to be developed in the attack by even a thin line in open order, so long as the required ammunition was at hand. They gave the defender the further advantage that they are quite independent of the *terrain* and permit a rapid concentration of fire at the decisive point. As I have said, the supply of heavy machine-guns to the troops was also increased; these represent a very great addition to the fire-power, particularly in the defense, and are able to inflict most serious losses on an imprudent attacker.

This has led to changes in the whole tactical grouping of the infantry. As compared with former times, the distribution has been completely revolutionized.

If the requirements of defense and subsequently of a more powerful attack led to the introduction of the machine-gun as the main weapon of the infantry, the situation thus produced involved the necessity of equipping the infantry with new weapons for its task in the attack. This increase of offensive power was also required as a reply to certain tactical measures which were designed to supplement the intensified fire-power of the defense.

The chief of these measures was the establishment of a defensive zone to which I have al-

ready referred. It had been continually the case that the attacking infantry simply overran the front line and captured the garrison.

The defender accordingly distributed his troops in depth and while holding his front line relatively lightly, spread his men over a complex of strong points, machine-gun nests, trench-mortar groups and single battery emplacements some way back. These did not form a continuous line and therefore could not be subjected to simultaneous bombardment if they were distributed skillfully and inconspicuously over the area in question. Thus the attacking infantry, even when they had taken the front lines, found themselves faced with fresh centers of resistance which could often be overcome only by artillery, and when at length they had mastered this fortified zone they came up against the defender's main line of resistance and met the full force of a counter-attack by the hostile reserves as well as the fire of the defender's artillery (which was far back), and this frequently without their own artillery being able to give them adequate support.

Thus the problem before the attacker was to get through this defensive zone—even when his own artillery had not completely prepared it for assault by the preliminary bombardment—and

to be able to beat off the hostile counter-attack, again with his artillery.

As I have said before, all this made it necessary that the storming infantry should be supplied with "infantry guns" to accompany them, as well as portable light trench-mortars which could destroy the enemy's "nests" by direct fire if possible at short range, and being entirely at the disposal of the infantry groups would be at hand at any moment they were required. Thus storm groups were formed, consisting of infantry, machine-gun sections, field artillery and trench-mortar detachments, which enjoyed a certain tactical independence. The defender, however, countered them with groups similarly composed.

This arrangement naturally presupposed certain definite conditions, conditions which permitted the main line of resistance to be established behind the rear-most line of the defensive zone, so that this could be abandoned to the enemy in case of need. Where this is not the case and a definite line—say a water-course or a line of heights—has to be held and there is no advanced zone which can be occupied, a different system must, of course, be adopted. But even in these circumstances the direct coöperation of infantry with trench-mortars and bomb-

throwers, artillery in the form of trench-guns, and heavy machine-guns has proved advantageous. The same applies to the encounter battle in open warfare.

It all depends upon circumstances. It is only the situation at the moment which can decide what measures must be taken. In these circumstances there is no room for tactics which are universally applicable like those before the war. On the other hand, certain individual principles may be laid down by which action should be determined in particular circumstances, and which, with a few formal manuals, form the basis of the rules. In such conditions it would be a mistake for the rules to go too far.

The first principle which must be accepted as of universal application in infantry tactics is that the light machine-gun (which is undoubtedly capable of improvement) is the principal weapon of the infantry, that every man must be perfectly familiar with its use and yet must be trained with the rifle also. The latter requirement is indispensable. It will not always be possible to employ the machine-gun, and targets will often present themselves with which that weapon is unfitted to deal. On reconnoitering patrols and similar enterprises the machine-gun would be a hindrance rather than a

help. It requires big targets to give full effect to its fire-power. Further, every man must be familiar with the use of the hand grenade, for there is no soldier who will not find himself in need of it some time or other. It is invaluable against targets behind cover, e. g., in trench or street fighting.

Next we may be quite certain that infantry fighting (i. e., infantry against infantry), apart from small raids due to special circumstances, will never again be possible without artillery support, because the fire-power of infantry which have not been rendered helpless by artillery is far too great and destructive for it to be overcome even by a superior force of infantry without the help of the sister arms. Thus the attacker especially cannot possibly dispense with powerful artillery support, and it will be a necessity for the defender also if his own infantry is prevented from making full use of its weapons by the hostile artillery fire.

Given these general principles for the tactical employment of troops, two broad groups of fighting methods must be presumed, groups which correspond to totally different conditions —fighting for a fortified position and the battle in open warfare. These two characteristic

groups can also be distinguished in real mountain warfare, but in this case the peculiarities of the *terrain* frequently have such a decisive influence that this kind of warfare requires special and separate consideration. In this book I will confine myself to war in hilly or flat country.

In the first place, we must clearly realize that the first group permits of numerous variations, while the second will never be entirely without the use of field fortifications. The defender will always try to dig in, and a pure encounter battle will be seen only when two attacks collide, and then only until one of the two opponents decides to act on the defensive, and thus resorts to the intrenching-tool once more: that is, if the maneuvers of his enemy do not compel him to defend himself likewise by maneuvering, e. g., meeting the threat of envelopment by a counter-attack.

It is thus impossible to lay down fixed and uniform rules even for these two great groups. There must always be a margin within the limits of which there must be liberty to take the special local circumstances into consideration. At the same time certain rules will always hold good under all conditions. Of these the most important are:

1. That whatever tactical systems or forms are employed, the increased power of artillery fire (which is quite extraordinary in comparison with past times) must be allowed for to the fullest extent.

2. That wherever unmounted troops are employed, there must be a certain distribution in depth.

3. That no attack may be initiated which has no definite center of gravity.

The whole enemy front must not be attacked in equal strength at all points. The main force of the attacker's fire and offensive power must be concentrated at one point, so that victory may be won at that point, a victory the effect of which will rapidly spread to the rest of the battle-front. In the same way no one must ever act on the defensive without reserves with which to meet the decisive thrust of the enemy. These definite principles will determine the depth of the distribution, the comparative strength of the individual elements of the defensive organization and the task which falls to each of those elements.

We will take the attack first.

In real open warfare the fundamental principle of the organization in depth will be the same as hitherto. The first wave must remain,

but it will consist of lines of men in open order and as thin as possible, in order to keep down losses, and a very large number of machine-guns, so that the greatest possible fire-power can be developed. Behind them will come the supports, whose business it is to replace the losses in the front line and strengthen it if circumstances require. They must also be in extended order, and must always dig in if they have to stay in one place for any considerable time. They may also go forward in waves if circumstances make it necessary.

Still farther back will be the reserves, which will be used to feed the action when all the supports have been drawn in; if the battle is fluctuating they will be employed to force a decision by a resolute attack in close order, or perhaps to beat off a hostile counter or flank attack. They may also use open order if the enemy's fire makes it necessary. Escort batteries and infantry guns must accompany the reserves, to enable them to intervene quickly and support the storm troops immediately their own artillery is prevented, by defective observation or any other cause, from helping the infantry attack directly and at all points with its fire.

In attacks against a fortified position two cases must be distinguished, according to

whether the defender is compelled by local circumstances to hold his front line, or is occupying a forward zone—an outpost zone, so to speak—with a view to gradually falling back fighting on his main line of resistance, and even if that is broken through, continuing his resistance in a prepared battle zone behind.

In the first case the enemy will always attempt to put down a curtain of fire—barrage or annihilating fire—in front of his own lines, in order to prevent a rapid advance of the attacker's infantry, and enable his own troops promptly to leave the cover to which the attacker's artillery fire has driven them.

When this happens the business of the attacking infantry is not so much to develop a great fire-power in their first wave—as it will usually be unnecessary for them to subdue the defending infantry by their own fire—as to get through the hostile barrage or destructive curtain as quickly as possible and with the minimum loss.

In such cases it will frequently be necessary to organize the front fighting line in several well-separated waves, with big intervals between the individual riflemen and machine-gunners. In this case the successive waves will have different tasks. Generally speaking, the first will have to advance to a definite point—

which must be fixed beforehand—beyond the enemy's first position. Here it will be reënforced by the second. The other waves will have to "mop up" the captured trenches and deal with any of the defenders still in them. Others will have to bring up entrenching tools, ammunition and machine-guns as quickly as possible, in order to adapt the captured trenches for defense without delay. If the front of the attack is limited, special storm troops will be assigned the task of securing the flanks of the captured position in order to be safe against local counter-attacks by the enemy. Lastly, reserves will follow to extend the success gained, if at all possible, carry on the attack and completely secure the captured ground.

The object of the organization in depth, and therefore its distribution, will be otherwise where the attack is dealing with an enemy who is not merely endeavoring to hold a certain line, but has arranged a mobile defense designed to bring the attack to a head in the forward zone, break its force there, and deal the decisive blow with the main force only when the attacking troops have reached a line much farther back. The attacking infantry in this case must advance in several waves, each wave

organized in depth; the number of the waves will be determined by the depth of the enemy's forward zones and the strength of his defensive system.

In circumstances such as these the attacker must be prepared to encounter a large number of machine-gun and trench-mortar nests, which will endeavor to hold up his advance, and which will generally be very hard to overcome, as machine-gun fire cannot usually be quelled by a frontal attack. He will also frequently find artillery groups, sections, and even isolated guns—all of which will be very hard to get at—in the forward zone. The attacker's task is not to let his advance be held up, but to get forward as quickly as possible and in the greatest possible strength. In these circumstances —as I have already shown—escort batteries and light trench-mortars must follow hard on the heels of the storm troops in order to destroy the enemy's centers of resistance without delay.

The infantry of the first wave must not allow itself to be held up by the defenses of the enemy. They must make every effort to turn the hostile strong points, as frontal attacks would cost too heavy losses, and not allow their progress to be hindered by them. Their capture must be left to later waves, which must

try to capture them from the flanks, or, if possible, the rear, after the infantry guns and light trench-mortars have prepared them for assault by direct fire.

Every possible effort must be made to arrive before the enemy's main line of resistance in the greatest possible strength and further to have fresh reserves at hand at this moment, for a hostile counter-attack, or a position which is particularly strongly constructed and held, must now be expected. The position may consist of a series of strong points or of one continuous line, and can therefore be dealt with only by a strong force. It is also obvious that the attacker's artillery must prepare this line for assault as soon as possible, and also subject the area behind it to a heavy bombardment, to prevent the approach of the enemy's reserves and break up their counter-attack.

In these circumstances a very deep distribution of the attacker's infantry in two, three or more waves is of vital importance, as I have said. Generally speaking, it will be necessary to divide the individual companies into three parts—a front line in open order, supports to follow them, and lastly an assault detachment at the disposal of the company commander, an element designed to secure him some influence

on the course of the fight. The heavy machine-guns will be at points which command or enfilade the field of action, and the commander will endeavor to direct their fire to the point where the decision is being sought. They must be concentrated as far as possible, in order to make full use of their great fire-power.

The tank attack, to which I have already referred, will also be useful in such circumstances. The tanks advance fifty to one hundred paces ahead of the infantry, in order to destroy all obstacles, break through the enemy's lines, and thus enable the infantry to get through. They will also endeavor to throw the enemy into confusion and attack him from the rear. The effect of their fire is relatively small—especially in rough country, and as a result of the artificial fog, which is designed to protect them against the enemy's fire—as accurate shooting is rendered very difficult by their movement and the conditions mentioned. On the other hand, they are, to a certain extent, capable of putting down men and machine-guns behind the enemy's broken lines, and thus threatening him in the rear.

Before them goes an artillery barrage, designed to keep the enemy's infantry under cover and frustrate the fire of the anti-tank

guns. Yet this barrage can seldom be very evenly distributed or uniform, as all the tanks cannot get forward at the same pace in uneven country—they move faster over firm, level ground than on a difficult *terrain*—and thus they soon fail to keep in line. When at last, in order to use their armament, they appear out of the fog which has concealed their approach, the barrage which has accompanied their advance has been left behind and they come within range of the fire of the anti-tank guns; they are generally soon shot to pieces or compelled to return, as the tank squadrons cannot be led or controlled any longer.

Taking all these things into consideration, it is plain that their effect is mainly moral. Thus the duty of the attacker's infantry, which is following up the tanks, is primarily to exploit the effect which these have on the defenders. They must, therefore, keep as close up to the tanks as possible, to increase the confusion they have spread, and break through the enemy's lines. If they keep far behind they will lose the benefits of the barrage. For these reasons infantry parties will often advance between the tanks to develop the success of the attack without delay, prevent the defenders

from getting out of their way, and intensify the fire-power of the attack.

All these advantages are, to a certain extent, counterbalanced by the fact that the closer the attacking infantry keep to the tanks, the more they will have to suffer from the artillery fire directed against these machines. The result is that even in an attack of this kind the infantry must not advance in a continuous thick line, but must be distributed in separate assault detachments which have less to fear from artillery fire. They must be organized in depth, to a certain extent, so that losses can be made good from the rear and strong points captured which have not been destroyed by the tanks in passing—and this without there being any need to delay the advance of the front line which must still be able to follow the tanks across the lines which have been successfully broken through. Further, artillery must accompany the later infantry waves, in order to facilitate the capture of strong points still intact and deal directly with the anti-tank guns.

As the control and direction of the tanks are practically impossible during the action itself, the tank line must be given a definite objective, and a point must be fixed to which the attacking infantry has to be led. The tanks will then

have to return to reserve, as they are not, of course, suitable for defense. The light tanks only will still try to get across the captured position and reach the area behind the enemy front in the hope of spreading confusion in the enemy's rear and doing as much damage as possible. Even then their operations will have to be limited to a certain extent, as otherwise their retreat will be most seriously menaced, especially if the enemy is prepared for them.

Just as the attacker has to allow for all conceivable methods of defense, the defender on his side has to prepare for all possible methods of attack.

If this idea be properly examined, one is soon led to the conclusion that the defense will have to adopt offensive methods to a greater degree than has been the case hitherto. In modern war it must be assumed that the attacker will always have a very powerful, and generally a very superior, force of artillery, and the inevitable result is that every defender who confines himself to holding a certain position purely defensively accepts the risk that his line will have been so shattered by the attacker's artillery that he will not be in a position to hold it with infantry.

This will always be the case in open warfare

where the attacker is able to make systematic preparation for the assault on the hostile position. The defender must therefore devote all his efforts to upset such preparations to the best of his power. This can be done in various ways, though only by unexpected counter-attacks either against the flanks of the enemy or with a view to recapturing the position he has stormed. The garrison of the front line must therefore be weak as a rule, in order that as few troops as possible may be exposed to the enemy's artillery fire, but behind the front large reserves must be held ready to counter-attack and recover the lost sector. An exception to this rule may be made only when the enemy is unable to concentrate a superior force of artillery with which to prepare the attack.

If the attacker finds himself forced to the defensive by a counter-attack he must at once dig in, in order to hold up the enemy's advance in a favorable line. But he will not use his reserves for fixed or local defense, but must always endeavor to group them if possible in such a way that he can employ them offensively, because that is the only way in which protection can be obtained, at least to a certain extent, against the enemy's artillery fire. In this case the tactics of the infantry will, generally speak-

ing, be the same in attack as before the war, with the difference that the machine-gun must be considered as the principal weapon of the infantry, both in attack and defense, rather than the rifle.

Thus in open warfare the only change, even in defense, is that allowance has to be made for more powerful artillery fire, machine-guns and trench-mortars. It is otherwise in trench warfare.

If a definite line must be held at all costs it is an advantage to have a forward zone and to construct the defensive trench-system in such a way that the enemy is unable to discover in which line the main resistance will be offered. He will thus be unable to concentrate the fire of his artillery upon that line. Dummy trenches will be an advantage in deceiving the enemy. The "forward" troops, on the other hand, must put up a vigorous resistance, hold up the enemy's approach from their fortified strong points, and try to draw his harassing and annihilating fire upon themselves. The action in the forward zone must also serve to deceive the enemy and to gain further time for the supports to be organized for battle and reserves brought up.

In the main line of resistance, which it is

intended to hold, the garrison must be under shell-proof cover as much as possible, so that their fighting powers will be comparatively unimpaired when the enemy arrives. If there is time, concrete dug-outs will be useful. At the same time reserves must be assembled, so that if the enemy gets through he may be immediately driven back again by a counter-attack. If this local counter-attack fails, a general counter-attack, well prepared by artillery and carried out by strong reserves specially brought up, is necessary, while such of the original garrison as are still holding their part of the line must secure their flanks against the enemy, even if he has broken through, and oppose the most stubborn resistance to any attempt to roll up the whole line.

If the proximity of the enemy or any other reason makes it impossible to hold a forward zone, every effort must be made to keep the garrison of the main line of resistance under shell-proof cover, strengthen the obstacles in front of the line as much as possible, and put down a dense barrage in front of the defensive system, so that in case of attack the garrison will have time to open fire on the attacker as soon as his artillery has lifted in order to open the way for his storm troops.

But in any case the chances of victory for the attacker in these circumstances are very great, and so the main instrument of the defense will be the counter-attack, which must be planned and organized beforehand. The defender's artillery must be distributed in such a way that immediately after the successful attack it can subject what was previously the defender's front line to an annihilating fire and simultaneously keep down the hostile artillery. Further, the artillery of the adjacent sectors must operate against the broken sector. Under the protection of this bombardment the lost position must be recovered by a counter-attack with reserves promptly brought up, while the artillery prepares to harass the enemy's infantry as it streams back and doubles its efforts to silence the hostile artillery.

If the intention of the defense is not to hold a definite line or position at all costs, but to defend a certain zone, the conditions will be similar to those obtaining in the defense of a position with a forward zone, and the only difference is that in this case the main line of resistance does not now play so important a part as in the cases already discussed. It will be held with energy and resolution, but there will be no compulsion to recover it by a counter-

attack. Resistance will continue to be offered, with the same stubbornness as in a forward zone, in a fortified rear zone to which the defender's troops will retire. In certain conditions it will be possible for the defender to draw the attacker so far after him that if the attacker's artillery is to play any further part it will have to change its position and get the range again, while his own artillery, which will have prepared for this eventuality and retired to new battery positions where all the new ranges are known, will only now begin to produce its full effect.

During this, the enemy's weak moment, every effort must be made to launch a counter-attack under the cover of the most violent artillery fire and with strong reserves. This counter-attack will presumably find the enemy's infantry scattered to a certain extent, and its prospects of success are thus good. It will also have the advantage that the defender's artillery, which is now in turn compelled to change its position, can return to its former emplacements, and thus the change of position can be carried out with the greatest rapidity.

In this kind of defense, from the tactical point of view, there will be assault, resistance, withdrawal and counter-attack of individual

groups which must give each other mutual support and coöperate intelligently though not in one continuous line. This form of action, however—and there must be no sort of doubt about this—is possible only if one has at one's disposal an infantry which is a perfect instrument of war, well trained tactically, completely reliable, and in the hands of officers and N.C.O.'s, down to the smallest commands, who are accustomed to act on their own initiative, hold their own even in the most difficult situation and preserve touch between the different groups. It must be an infantry which never allows a retreat to turn into flight. If one's troops are not in that category it is better to fight in and for a definite line of defense.

A self-possessed infantry with strong nerves is also an indispensable weapon for the defeat of tank attacks.

It will never be possible, except within definite limits, for the defender's infantry in the front line to attack or disable the tanks by themselves. They will have to try to protect themselves locally by tank traps and tank mines, so far as circumstances permit those measures. Otherwise the duty of the defender's infantry in the front line is to deal with

and hold up the attacking infantry which is following or advancing in line with the tanks.

With a view to doing so they must get out of the way of the tanks, allowing them to pass them, and must, therefore, never themselves fight in one continuous line. They must be distributed in groups to admit the passage of the enemy's attacks, and must be in a position to take cover outside or in the attacked trenches themselves. They must also quietly let the enemy's barrage sweep over their heads. The defending infantry must further be organized in depth so that hostile infantry and machine-gun parties which are deposited by the transport tanks behind the front lines can be attacked and if possible annihilated before they have time to cause trouble and confusion. The rear groups of the defending infantry are also intended to protect the emplaced or mobile anti-tank guns and light trench-mortars, so that these without anxiety for their own safety can destroy the tanks or compel them to return. Any cavalry which is following the tanks, as frequently happens, will then be easily dealt with.

Here again we see the infantry fighting in groups and working in the closest coöperation with artillery and trench-mortars. Indeed,

small independent groups, composed of these three arms, will be formed—the so-called tank forts—which will be in a position to prove an insuperable obstacle to the advance of the tanks. Mobile anti-tank guns also will often have to be concentrated. If the defender has further succeeded in holding up the hostile infantry following up the tanks with the aid of the rifle and machine-gun parties left unsubdued by the latter, a counter-attack, well prepared by artillery, will often find a situation which holds out the greatest promise of success. The vital element is that the infantry must not let its *morale* be shaken, the anti-tank guns must be correctly distributed and the whole area systematically prepared for defense against the tanks.

Looking generally at the demands which will be made on the infantry, both in attack and defense—and in open as much as trench warfare—we shall soon realize that an immense change has taken place in the tactical uses of all arms, and that our organization and regulations must make full allowance for it.

The company will certainly remain the smallest tactical unit, but its constitution must be revolutionized. The division into three platoons has proved its value, but the platoons

themselves must be organized in groups composed of machine-gunners and riflemen. Every company must have telephone detachments and runners. In case of necessity the company commander must have an assault detachment as a special reserve. It would be a last reserve which that officer can throw in at the decisive point. All the men must be trained with the rifle, the machine-gun and the hand grenade, as I said above. The heavy machine-guns must be formed into separate companies so that their fire may be as concentrated as possible when they are brought up to the decisive sector of the battlefield. It is only in the defense that the commander will be frequently compelled to use them by sections. The old war establishment of 250 men to the company has proved too high in the modern "group" action. The establishment must be 150, not counting the train [1] personnel and necessary details.

The division of the regiment into three battalions has proved sound. It would be better, however, to keep the battalion of four companies so that the battalion commander will have a reserve at his disposal even when he is compelled to hold a comparatively broad front and tactically to distribute his men very widely

[1] Corresponds with our A.S.C. (Tr.)

or deeply. A heavy machine-gun company will also be attached to each battalion, and a labor company formed of less fit men, the latter for the purpose of supplying drivers for the transport, clerks, officers' servants and all the details which are continually being required behind the front, supply orderlies, work in the various supply, ammunition, pioneer and stores depots, and similar necessities. Further, a telephone detachment—not too small—must be attached to the battalion staff. At the present time all these detachments, most of which do not require the full standard of medical fitness, make the most ruinous inroads on the fighting strength of the unit.

Lastly, individual groups will have to be put under the direct orders of the regimental headquarters staff. First among these we must place the telephone detachment with all its branches and then the labor companies. The trench-mortars, constituted in special tactical units, must be under the direct command of the regimental commander, while every regiment must have a battery of infantry guns—six guns to the battery, which may be distributed among the battalions if necessary—permanently attached to it. These batteries will be under the divisional artillery headquarters for technical

and artillery purposes, but under the commander of the infantry regiment for tactical purposes.

Whether it is necessary to give the three regiments which compose the division a brigadier is a question which is much debated in the army. The brigade has often been nothing more than a channel of communication. Personally, I regard it as absolutely necessary. The divisional commander is not so well able to have a continuous and thorough grip on the regiments and their tactical movements as the brigadier, whose principal function it is to exercise such control and insure a uniform conduct of the infantry action. Both in peace and in war a stage between divisional and regimental headquarters is extremely necessary, even from the practical point of view.

The movements and action of the infantry must be restricted to the most simple principles (this was done to a large extent even during the war), and the essence of all training must be the physical and, above all, the moral training of the men and their leaders. Fighting in separate isolated groups, which are none the less animated by one fundamental idea, demands a high degree of tactical knowledge and personal resolution from all the subordinate

leaders, for it is quite impossible to direct such fighting by general orders.

The object of the action and its final goal must be known to all the individual groups—indeed, to all the individual men. They must be familiar with the general principles of action, but definite instruction on the methods to be adopted cannot be given—as they used to be for infantry attacks in the old days—and it is certain that orders will not always reach the individual groups in action. The letter of action is entirely secondary to the spirit, and the former will be subject to perpetual changes.

With this method of training strict discipline and severe drill of the individual soldier must go hand in hand in order that a sense of duty may become second nature to him and accustom him to the resolute concentration of all his moral and physical powers. The regulations will take account of these desiderata, and the whole training will be aimed at their realization, for we shall be compelled to give far greater latitude to the independent decisions of the leaders—down to the most subordinate commands—than we have hitherto, and will have to confine ourselves to seeing that they are inspired by right principles.

The independence of all leaders of troops,

especially those in direct command of men, has become very much more important. This fact determines the character of the whole training. At the same time vital importance must be attached to the training of individual character. The demands upon the endurance, courage and audacity of the individual have been very much increased by the immense power of modern weapons. In addition there is the fact that, as the result of modern fighting methods, the men are left to their own devices much more than before. They are no longer carried along by the crowd; they are frequently deprived of the influence of their officers, and find themselves with nothing to depend upon but their own sense of duty and their own inherent worth. They can be equal to the requirements of the situation only if the bond of unity is strong, their moral sense high, and the idea of discipline, that true soldierly virtue, has become part of their flesh and blood.

All this, of course, makes the highest demands on those in positions of command who are destined to be trainers, instructors and leaders, demands far greater than have ever been made before. At the same time it gives the officer's profession an even higher status and consecration than it has ever known.

II.—Artillery

It is just as impossible to speak of uniform artillery tactics as of uniform infantry tactics. The functions of artillery have multiplied and become far more important. The number of types, calibers and natures of ammunition have increased, the enemy has now to be fought in the air also, and the different species of operations make fundamentally different demands. Moreover, the character of the theater of war has a very material influence on the mobility of this weapon, and therefore on the opportunities of employing it. In roadless Russia the same guns cannot always be used nor artillery operations take the same forms as in France, which is well supplied with roads and railways, or in the mountainous regions of the Alps and Carpathians.

We must first draw a distinction between the uses of artillery in open warfare and in trench warfare, while pure mountain warfare requires separate consideration, even from the artillery point of view.

In the first case, i. e., operations in which both sides maneuver and the attacker is not faced by continuous, uniform and more or less fortified lines which he *must* attack frontally, if

at all, even to-day much the same principles apply as were valid before the World War. The field artillery, including the heavy field-howitzers, are the deciding factor. Whether it is possible to give the troops heavy long-range guns and mortars depends upon the nature of the battlefield and the condition of the lines of communication. I have known cases in Russia where 10 cm. guns had to be left behind because they could not be got forward any farther. Anti-aircraft guns, on the other hand, must accompany the divisions everywhere.

In open warfare, in any case, the artillery must be much stronger than hitherto in comparison with the infantry, so that the enemy's fire, which will be more intense than heretofore, may be dominated and the way opened for the infantry attack. It will be extremely important to make the fullest possible use of the factor of surprise in concentrating the mass of one's artillery against that part of the enemy's front against which the main and decisive assault is to be delivered. To attain this object it will be absolutely necessary, as I insisted even before the war, to avoid assigning all the artillery to divisions, and to concentrate a large artillery reserve in the hands of the army or army-group commander (in certain circumstances

even the corps commander), so that it can be employed at the decisive point. The same rule applies to the ammunition supplies.

In other respects artillery operations will take much the same form as before. The artillery will practically be restricted to shooting from observation, either ground observation or with the help of balloons and aircraft. The importance of flash-spotting and sound-ranging units, as well as squared maps, will become secondary, because one will hardly ever have sufficient time to make the necessary preparations. These circumstances will also limit the use of the greatest ranges. Generally speaking, the artillery will be employed in large groups and without material distribution in depth, partly because of the limited opportunities for observation and partly for the sake of securing centralization of control and effect in the short period of preparation.

In this connection it must be remembered that in the majority of cases the action will develop out of strategic maneuver and that the time in which to prepare for the attack will be adequate only if one of the two sides decides to adopt the defensive in a fortified position. Even then it will be advisable to make the attack as soon as possible to prevent the enemy's

having time to settle down in the position he has selected.

In addition to the main artillery force, the task of which is to silence the hostile artillery and hold down the hostile infantry until the time for assault is ripe, certain units of field artillery must directly accompany the infantry attack, for even in open warfare it must be assumed that as the attack proceeds enemy strong points and machine-gun nests will be encountered which have not been discovered or sufficiently silenced by the main artillery force and will now open a surprise fire at the decisive moment. They must be dealt with promptly and effectively if the attacking infantry is to be spared heavy losses. This task will be assigned either to the infantry-gun batteries and light trench-mortars which are permanently attached to the infantry, or else to the escort batteries drawn from the main artillery force for this precise purpose. It must be possible not only to employ these batteries in complete formations but to distribute them in sections or even in single guns. This principle applies, of course, to the same batteries in trench warfare, and means that the subordinate commanders must have a particularly good tactical training. In other respects artillery opera-

tions in trench warfare are absolutely different from those in open warfare.

In this second case the artillery, which is strung out along a very extensive front, has the duty of being ready to meet a hostile attack at any moment and also to damage, and keep on damaging, the enemy by maintaining a steady fire on his artillery and infantry, harassing his transport and shelters and destroying his fortifications. Finally, it will have the duty of hindering hostile aërial observation as much as possible and protecting important points—stations, dumps, headquarters, billets—by anti-aircraft defenses. For this purpose the anti-aircraft guns must be distributed not only behind the whole front, but well over the back areas also, and at points which are favorable for the purpose in view. They will be concentrated in considerable numbers sometimes at one point, sometimes at another, according to the importance of the operations in view.

Further, machine-guns will be assigned on the largest scale possible to all batteries; their function will be to protect the batteries against attack from the air and defend them against infantry attacks if the enemy breaks through.

Yet the most vital function of the artillery

in offensive operations is to silence the hostile artillery so completely that it can no longer do any harm to the advancing infantry; further, to prepare the enemy lines and fortifications for assault, while paralyzing the hostile infantry and shattering their nerve so effectually that they are no longer in a position to offer serious resistance.

Generally speaking, the ordinary daily tasks of the artillery require its uniform distribution over the whole battle-front and a certain organization in depth, both in order to make full use of the ranges and also to avoid presenting, by too much concentration, that splendid target for the hostile artillery which batteries grouped together always represent.

For purposes of defense, the artillery must be grouped in such a way that the hostile lines of approach can be harassed by heavy and the heaviest long-range fire, or at short range by field guns also, while the assembly trenches of the enemy's infantry can be brought under destructive fire and a barrage or curtain of destructive fire of the greatest possible density laid over the area which the attacking infantry must cross to reach the defender's lines. As a rule high-angle fire will be employed against the enemy's assembly

trenches, because the target is generally behind cover, and a further requisite is that the hostile machine-guns should be put out of action. Hence, heavy and light field howitzers and mortars will be employed. The same guns will serve the purpose of neutralizing the hostile artillery, but in this case long-range flat-trajectory guns will be useful at long distances.

For the purpose of a barrage in front of one's own line light field guns are the principal weapon. Where a reliable shrapnel is available (which is not always the case where mass production of ammunition is concerned), the employment of this nature of ammunition is particularly to be recommended when the barrage is to be laid from the flank, i. e., an enfilading position. However, the nature of ammunition and the setting of the fuse depends upon the country and the distance between the hostile lines as well as upon the particular kind of moral effect at which one is aiming. For general purposes the percussion-fuse shell is to be preferred. Heavy field howitzers can also be called in to intensify the destructive character of the barrage, while an enfilading effect can be obtained by the coöperation of medium 10 cm. flat-trajectory guns from adjacent sectors.

The mortar barrage, on the other hand, will

not be laid immediately in front of one's own lines, because the range of the burst is great enough to endanger one's own troops. On the other hand, mortars are the most useful weapon for destroying hostile fortifications, as their effect is enormous. Heavy field howitzers will also be used for this purpose in order that the largest possible number of guns may be employed on this work of destruction, while light field howitzers can be used against targets which are not shell-proof.

These different purposes will determine the distribution of the artillery and its organization in depth, but another point of view must certainly be carefully borne in mind. It has frequently happened that when an attack has been successful, either as the result of surprise or for some other reason, a large portion of the defender's artillery has been lost, because it was too close up to the line and could not be withdrawn in time when the enemy's infantry came up. It will thus be necessary to keep the defender's artillery as far as possible behind the main infantry position, protect it by obstacles and special strong points, and have infantry reserves in the immediate vicinity, so that the guns cannot easily be overrun.

The vital factor in determining the position

of the artillery is the requirement that the bulk of the artillery must be able to direct its fire at the most effective ranges against the assembly trenches and lines of approach of the hostile infantry; further, to beat off a tank attack, no matter how, and reach the hostile artillery at any rate with the guns of longer range.

Thus, under all circumstances the annihilating fire must reach the enemy front line in which preparations for attack may perhaps be in progress. The guns of longest range will be emplaced nearest to the artillery defense lines in order that they can reach the most distant targets. On the other hand, the batteries earmarked for annihilating fire and the barrage must usually be emplaced farther back.

If it is impossible to perform the current daily artillery tasks against more distant targets from these emplacements, special guns or batteries must be brought up to perform these duties. For defense against a surprise tank attack the largest possible number of quick-firing guns must be brought up permanently to the main line of defense and emplaced in such a way that their fire commands the whole area which is suitable for the tank attack. Mobile anti-tank guns will also be held ready to be

employed against tanks at any point. Alternative emplacements must be prepared for all fixed batteries, so that they can escape the enemy's fire the moment he begins to bombard them systematically.

The divisional artillery will be entirely in the hands of the artillery general, and divided into two separate groups to each of which a special task is assigned. At the same time it will not be possible to constitute the individual groups out of guns of the same nature, as each of them will have to fire at the most varied targets. It will often happen that field guns will have to be used with light field howitzers or 19 cm. guns in one group. Even heavy and light guns will often have to be incorporated in one group for action. Mortars 13 cm., and in some cases 15 cm. guns, will be assigned to the groups as circumstances require. Each group will be given a definite sector of the enemy's front and have to deal with all the targets in that sector. It will often be necessary to distinguish short- and long-range groups and organize the battery emplacements from that point of view. As a rule, only the heaviest long-range guns, railway guns and similar natures will be employed by themselves, as these are usually assigned directly to the corps,

armies, or army groups, under a group commander.

In these circumstances it seems necessary, for purposes of the order of battle, to assign permanently to divisions, which are the real tactical unit, the guns which they always require, i. e., field guns and light howitzers, infantry guns, heavy field howitzers and 10 cm. guns. On the other hand, mortars, more field howitzers and heavy long-range batteries can only be lent to them from army or G.H.Q. reserve when special circumstances require. On some occasions it will also be necessary to supply a reënforcement of field guns.

Such special circumstances will arise when some particular task is set in ordinary trench warfare, and above all when the imminence of a great hostile attack has been recognized or such an operation is planned on one's own side. The first case will, usually speaking, apply to the whole front, as there are special tasks to be performed at all points, though at some less than others. Such tasks are as follows: Destroying particularly formidable strong points, bombarding enemy billets at great distances, important industrial establishments behind the front, troublesome batteries a long way off, railway lines and similar targets. It will thus

be essential to give all divisions in line a few mortars and heavy long-range batteries in addition to the normal divisional artillery.

On the other hand, when a great hostile attack is imminent and it is necessary to take measures to meet it, a strong force of artillery, superior to that of the enemy if possible, must be concentrated.

As the attack determines the form of the defense, it must receive our attention first. In the offensive, artillery can be put to the most varied uses.

In the attack, as we already know, it is necessary to prepare the way for the infantry assault by destroying the hostile obstacles, strong points, trenches and other defense works, paralyzing the hostile infantry so that it can make no adequate use of its weapons and silencing the hostile artillery before one's own infantry goes forward. Success in this last task is of vital importance as, if the defender's artillery is still effective, it can make the attack impossible. During the infantry attack itself it is necessary to prevent the defender's artillery from recovering itself and to protect the attacking infantry by a barrage which creeps before them and is timed to conform to their progress. Lastly, the duty of the artillery is

to accompany the attacking infantry and clear the way for them, even when their advance has carried them beyond the range of the barrage.

Thus we have a series of tasks which are not easy to perform. The first great difficulty is to keep the preparations for the attack and the concentration of the artillery from the knowledge of the enemy. The battery emplacements must be reconnoitered, surveyed, and the sites marked. The roads from the rear to the battery lines must be improved and extended. Enormous quantities of ammunition must be brought up. Some of it will come with the batteries, while the rest must be in dumps close at hand and protected against the weather. Lastly, the batteries themselves must be brought up.

If circumstances at all permit, the trench-mortars (heavy, medium and light) must be emplaced immediately behind the front infantry lines and well supplied with ammunition, so that they can prepare the way for the infantry assault by bombarding the enemy front lines and thus relieving the artillery.

All this means a certain amount of activity which it is very difficult to keep from the knowledge of the enemy. Even though all work is done on principle only by night and the great-

est precautions are taken against observation from the air, it is extremely difficult to hide these great movements. Enemy aircraft are certain to notice something, spies will reveal a good deal and prisoners from one's own troops will often betray what is going on. The operation planned must therefore be kept even from one's own troops, for surprise is a very material factor to success. If the enemy gets wind of the approaching attack he will be able to take effective counter-measures.

The second great obstacle is the difficulty of finally and decisively neutralizing the hostile artillery, including its most distant batteries. The dispositions of the attacker's artillery must be designed to meet this difficulty, as I shall soon show. In many cases gas-shell will be the best weapon in dealing with artillery. A surprise gas bombardment will certainly cause losses, and in any case—as I have said before—it will compel the enemy to wear masks and thus make it extremely difficult for them to serve their guns or bring up ammunition. Besides, it is quite impossible to go on working in masks for any length of time. Thus, if the gas-shelling begins before the infantry attack and the gas-cloud is kept thick as long as pos-

sible, the hostile artillery will frequently be silenced or compelled to withdraw.

In certain circumstances high explosive can be used as well as gas-shell, in order to inflict bloody losses on the enemy, destroy his ammunition and damage his material. Further, the attacker's artillery must be so strong that, in addition to gassing and neutralizing the hostile artillery, it can perform its ordinary tasks, and while doing so continue the gassing of the defender's artillery with an adequate number of batteries.

These other tasks may be summarized as the duty of doing the greatest possible damage to the enemy's defense works so that the way will be cleared for the infantry attack, accompanying that attack as long as possible with a barrage, thus enabling progress to be made without heavy losses.

The barrage will consist of high explosive or gas-shells from the largest possible number of field guns and heavy howitzers. It will go forward at fixed intervals (which must be settled beforehand in accordance with the infantry's anticipated rate of progress) from sector to sector in order to keep the hostile infantry immediately in front of the storm troops under

cover, shake their nerve, and thus spare the attacking infantry heavy losses.

The heavy mortars can also be used to cooperate by sectors in the barrage, but in that case they must fire ahead of it for fear of injuring their own infantry. They will direct their attention to the most formidable of the enemy's strong points and defense works which will first be reached by the infantry behind the barrage. It would be very desirable if this systematic barrage, the time and direction of whose movements have to be fixed beforehand, could be made elastic so that it could directly conform to the advance of the infantry, whether fast or slow. Unfortunately there are practically insuperable difficulties in the way. This point will be discussed in a later chapter.

If an adequate force of artillery is available the effect of the bombardment can be intensified by giving it a certain depth. Our enemies, who had guns innumerable at their disposal, sometimes gave their barrage a depth of several kilometers. Thus the defenders have not merely to endure the fire of a narrow barrage for a relatively short time, but to hold out during the long period which a barrage of a depth of several kilometers takes to pass over their heads. In such conditions the attacker's pros-

pects of putting the defending infantry out of action are naturally much greater than with an ordinary barrage, at any rate if the density of the deep-zone fire is anything like that of the narrow.

As a rule it will be impossible to carry out these tasks completely from the artillery positions in ordinary trench warfare—which are very far back—as full use cannot be made of the ranges in the manner required by the offensive. And so, at the risk of being suddenly attacked, the batteries which are to neutralize the most distant hostile batteries destroy the enemy's defense works in the back area and participate in the barrage must be brought as close up to the departure trenches as is possible with due regard for secrecy.

On the other hand, the batteries which are to engage the nearer targets must be placed farther back. The most forward batteries should, if possible, be brought into position only the night before the attack. As a rule registration will have to be dispensed with. Generally speaking, shooting will have to be by the map (very accurate maps, of course) or the Pulkowsky system, while the greatest possible use will be made of aëroplane observation later on.

Further, it is very difficult to give the infantry the protection of artillery fire and support them in their task when they have once passed the extreme limits of the ranges of the guns. Whether the surprise has succeeded or not, their task will become more difficult the farther they advance, for the hostile reserves concentrated in the back area or brought up from a distance, reserves which the attacker's artillery has not been able to reach, will now appear on the scene and face the attacker's infantry, which is perhaps already exhausted. Its need of artillery support will then be all the greater. The artillery must therefore stop at nothing to follow it up and continue firing from new positions, if possible without interrupting or diminishing the volume of fire. It is an extremely difficult matter to achieve this feat. The part played on such occasions by escort and infantry-gun batteries has already been discussed in the chapter on infantry tactics. They will be the first to follow the attacking infantry, either immediately or as close behind as they can get.

The first serious obstacle in their path will be the very difficult ground which is the first fruits of trench warfare. Between two trench-systems which have been the scene of fighting

for a considerable period there is usually a No Man's Land which has been plowed up all over by the artillery of both sides, a waste where all roads and tracks have been destroyed and the shell-holes are innumerable.

If this area is to be made practicable for artillery, labor units, with the necessary material, must follow hard on the heels of the storm troops, in order to construct roads for the guns, bridge trenches and shell-craters, and deal with impassable places. This is frequently a very difficult problem, which involves a great loss of time, particularly in areas with much ground water. Adequate preparation must be made, and the work carried through with the greatest energy. Good roads must be made, especially for the bulk of the artillery, heavy guns and ammunition columns. The quicker the artillery is sent ahead the better it will be. Of course the difficulties will be less where there has not been so much ordinary trench warfare before the battle and No Man's Land is less plowed up. Yet it will always be a troublesome business to make the enemy's lines and trenches (which have been destroyed by the attacker's artillery) practicable for its advance.

With a view to having artillery ready to go

forward without weakening the attacking artillery still in action, it is advisable to have a second relay of guns behind the latter. These guns will have taken no part in the artillery action and can be brought up immediately the ground has been made sufficiently practicable.

These batteries will be followed by the hindmost batteries of the attacking artillery the moment they have to stop firing owing to the range having become too great for them. On the other hand, precautions must be taken against sending forward too much artillery at once and thus placing too great a strain on the roads, as guns cannot be fought without the necessary ammunition. Batteries and ammunition must be sent up in fixed proportions. The batteries must follow the infantry as far as possible and try to fire with the help of ground observation at first, aërial observation subsequently.

Their method of operation will then be determined by the requirements of open warfare. As there can be no centralized direction or control of the artillery in these circumstances, it would be a good plan to assign the artillery, both light and heavy batteries, which first arrives, to the infantry regiments, so that separate self-contained tactical groups are formed.

Each infantry regiment will then indicate to its artillery the tasks the fulfillment of which is necessary to the further development of the action. As the batteries come up they will gradually be formed into groups, but it is only when the bulk of the artillery has followed the infantry that the artillery commander will be able to resume command of the batteries and groups, so far as their attachment to the infantry regiments is not found to be necessary for some further period.

If there was originally a second artillery wave, another one will now be formed, composed, of course, of batteries other than those which had constituted the first, and thus the next stage of the advance will be prepared.

If time and circumstances allow, it will naturally be desirable, if possible, to settle on the new battery positions on the first day of the attack and supply the necessary artillery maps so that the guns can shoot by the map even where ground and aëroplane observation are impossible. This method will suffice, however, only when a large number of theodolites are available—at least one to every two batteries —while the batteries press forward directly behind the reserves of the advancing infantry with the artillery officers who are to recon-

noiter and site the new emplacements. An abundant supply of material for artillery maps must also be taken with them. As this is seldom possible, however, the fixing of aiming-points for the new emplacements will generally have to be dispensed with. In any case, it is more important to follow the infantry as rapidly as possible and give them good artillery support at the earliest possible moment after they have got beyond the range of the most advanced batteries of the attacker's artillery. For that purpose it will be important, apart from promptly making the ground practicable for artillery, to send the sausage balloons forward as soon as possible, and get the artillery aëroplanes into action under the protection of the pursuit flights. Wireless must be immediately carried forward with the artillery for the purpose of communication with the observation aëroplanes. The vital necessity is that the artillery attack should be kept going continuously, and that its fire should not be allowed to die down or diminish even for a moment.

Although I have been discussing the employment of artillery for a special kind of attack, it is essential to point out that methods of attack may be extremely varied. It has repeat-

edly happened that the attack, when favored by the conformation of the ground or concealed from the eyes of the enemy by natural or artificial fog, has dispensed with a preliminary bombardment altogether in order to have the advantage of complete surprise. In such cases it is accompanied by a deep and dense barrage only. Such a method is particularly advisable when the attacker has a sufficient number of tanks which precede the infantry, flatten out the enemy obstacles and climb over his trenches and shelters. The moral effect of such an attack can be very great.

In contrast to the surprise method, the attacker may choose to continue the preliminary bombardment and the neutralization of the hostile artillery by the expenditure of a vast amount of ammunition in harassing and annihilating fire which goes on for days on end. The purpose of this method is to make it completely impossible for the defender to remain in the area attacked, and destroy all his defense works one after the other by the use of the heaviest guns. This last system can even be combined with the tank attack, which should aim at the greatest possible effective surprise. Thus the tasks of the attacker's artillery will be extremely varied. But there will always

be the difficulty of the artillery concentration, and also the necessity of sending batteries forward after the storming infantry when the attack has succeeded. These difficulties will be particularly formidable after days of drum fire extending far into the enemy's back area.

The method of the attack determines the form of the counter-measures to be adopted by the defending artillery. Of course, its primary task is to annihilate the attacker's infantry in their assembly trenches, or, if this fails, to deal with them as they advance towards the defender's infantry lines. But it will only be able to fulfill this duty if it has not been previously silenced or neutralized by the attacker's artillery.

Thus, the first business of the defense is to maneuver with its artillery in such a way that the latter cannot be neutralized by the enemy's artillery. If the enemy's intention to attack has been discovered in time and the defender has a sufficient artillery reserve at his disposal, he will endeavor to strengthen the artillery on the threatened sector to such a degree that it will be equal, or if possible superior, to that of the attacker. Further, the defender will make full use of gas bombardment. As the area of the enemy's battery emplacements

will not be entered by the defender's own troops, he can saturate it with gas and thus compel the attacker's artillery to evacuate it. Of course this will require an enormous expenditure of gas-shell.

The defender will always be forced into this kind of life-and-death duel with the attacker's artillery when the lines of the opposing sides are very close and the defender's front line must be held for local or strategic reasons. In these conditions, if the attack comes by surprise so that an adequate reënforcement of the defending artillery is impossible, while the front line itself is not very strong or in a position to withstand the heaviest bombardment (perhaps open to a tank attack also), the attacker's prospects of success are very great.

The defender's chances are a good deal more favorable when he has any kind of deep forward zone in front of his main line of resistance. This would mean that the enemy's artillery has to keep at a more respectful distance, while his infantry have to master the forward zone under the fire of the defender's artillery before they reach the main line of defense.

The defending artillery must therefore be distributed in such a way that it can lay an annihilating barrage in front of the forward

zone, fight the hostile artillery, and yet preserve some of its batteries from the attentions of the enemy's fire. To a certain extent these are patently self-contradictory demands, which can be met only if the defender has an extraordinary force of artillery at his disposal. If the hostile artillery is equally strong or stronger, the defender will be compelled to choose between the two sets of requirements, and by skillfully grouping the various natures of guns, try to attain his end at least to some extent.

The most favorable situation of all for the defender, from the artillery point of view, is when circumstances enable him to give his opponent the impression that he intends to hold a certain position, while in reality he evades the blow and meets his adversary's thrust in a position lying considerably farther back. In such a case he can keep his whole artillery—with the exception of a few batteries sent forward to deceive the enemy—out of range of the latter's fire. His artillery will be distributed behind his main line of defense in the rear; he will concentrate his whole fire in front of the latter, and thus make it quite impossible for the enemy's infantry to storm it.

In such a case the attacker will be able to ad-

vance only by stages, and when he has captured the dummy position he has to arrange a fresh artillery deployment before he can continue the attack. His chance of surprising the defender has definitely gone, and with it a very material and often decisive advantage for the attack.

If the attacker's artillery is so strong that it can search the whole area of the defender's lines in days of drum fire, the defender will withdraw his own artillery—and even the bulk of his infantry, except such part of it as can be accommodated under shell-proof cover—out of range of the enemy's fire, and distribute it in such a way that it can take the advancing hostile infantry under the most effective destruction fire. The defender will then endeavor to harass the enemy's artillery with long-range gunfire only until sufficient artillery reserves have been brought up to deal with them effectively. The maintenance of the position will then depend upon the success of the counter-attack.

A tank attack makes special demands upon the artillery of the defense. If this attack is to be beaten off the first requirement is that the tanks should be exposed to an intense destruction fire during their advance, which is generally shrouded in fog. In the second stage,

when they have come out of the fog, they must be fought and destroyed by a large number of anti-tank guns distributed over the area concerned for this very purpose. These anti-tank guns will work by direct observation. If the destruction fire is to be really effective, it will be essential in this case also to distribute that part of the defender's artillery to which this task is assigned so far back that the hostile artillery will not be able to neutralize it in time. On the other hand, it is important that the anti-tank guns which are to destroy the tanks at short range, as well as the light trench-mortars on special mountings which are to be used for the same purpose, should be as close as possible up to the line in which the enemy's attack is to be held up, and which the tanks must therefore break through.

The difficulty in this case is for these guns and their detachments to remain an effective fighting force during the preliminary bombardment by the enemy's artillery and while his barrage is passing over them. In fact it will be possible only if their position is unknown to the enemy and the men at least are under shell-proof cover.

In the case of the mobile anti-tank guns there will be the further difficulty that the teams

also have to be preserved from destruction. Generally speaking, this will be possible only if the defender succeeds in neutralizing the attacker's artillery to a certain extent, so that the latter is compelled to employ part of his artillery permanently against the defending artillery. This again will be made more difficult by the fact that no small part of the defender's force of field guns have to be employed as anti-tank guns from the outset, and therefore can take no part in dealing with the attacker's artillery.

Here, again, the defender is faced with contradictory and apparently irreconcilable demands which can never be wholly satisfied. The upshot of the whole matter is the brute fact that in this case, as in every other, the defending artillery can never be too strong. If it is known that an attack is imminent all artillery reserves within call must be brought up. Emplacements for artillery reënforcements must be established in every part of the front to be defended. The ranges must be established and suitable artillery maps supplied.

Turning to artillery methods in detail, it is of course necessary that, if it is at all possible, shooting be from observation. This system alone is a guarantee of adequate results.

An endeavor should always be made to obtain ground observation or observation from balloons or aëroplanes. But this will not always be possible. Observation is out of the question at night or in dense fog, and yet even in these circumstances the infantry cannot be left without any artillery protection, nor can the enemy be allowed to advance unmolested.

Targets of considerable size can be engaged without observation by shooting by the map, due consideration being paid to weather or other special influences. By this method the whole area occupied by the enemy can be harassed, roads and railways swept and billets and stations shelled. Fire of this kind, even without observation, is particularly important in a large-scale operation.

It can always be employed where it is desired to sweep considerable areas or definite sectors, but not to engage small targets. Thus unobserved fire is inevitable in gassing hostile groups of batteries or considerable portions of the enemy's lines and assembly trenches for the simple reason that these operations are best carried out at night. In this case the intention is merely to spread thick gas-clouds over a considerable area. Again, observation is neither possible nor necessary for the creep-

ing barrage, the forward movement of which has to be settled by the clock. All that is required here is to pay the most careful attention to the errors of the day and other special influences.

The ordinary barrage, and frequently destruction fire also, have to be carried on without observation. This barrage means that the defender spreads a curtain of fire of the greatest possible density in front of his own lines. The attacking infantry have to pass through this curtain. The method will be effective only if the defending artillery is so strong that the barrage is extraordinarily dense, and if possible comes from the flanks. Otherwise—if there are gaps—it is only too easy for the attacker to slip through. As I have said before, shrapnel (if the shell is really reliable) is the proper nature for this operation, especially in the case of an enfilading barrage, though the time-fuse shell also is very useful in these circumstances. The batteries concerned must have registered very accurately beforehand. It is impossible to correct the range once the barrage is begun, as it has to be laid down at its maximum intensity the moment it is required.

In cases where the necessary density cannot be obtained, destruction fire is a useful substi-

tute. The latter does not, indeed, cover the whole front, but its effects against the known or suspected assembly points of the hostile infantry are even greater, and it can quickly be concentrated against them. As a rule it will be observed fire against known targets. If it is to take the place of the barrage, without observation being possible, it will be directed against the enemy's prospective assembly points on which the batteries concerned will have registered beforehand. In this case, however, it must not be a fixed and rigid curtain like the barrage, but must be shifted to the flanks or rear as occasion requires. It will frequently be necessary to bring it back sharply to catch the hostile infantry as they leave their assembly trenches. The fire must be distributed in such a way that the enemy can never know for certain where it will fall and make his arrangements accordingly.

Destruction fire against smaller targets—batteries, individual strong points, command and observation posts—will be useful only when it is accurately checked by observation. If the artillery is to be safe—as far as safety is ever possible—against the *enemy's* destruction fire, the batteries must shift their positions frequently as soon as they suspect that their em-

placements have been discovered by the enemy.

Among the weapons used in preparing an attack we must not forget the gas-shell mortar, which in a certain sense forms a separate arm, but in view of its functions is part of the artillery. This mortar is built into its emplacement and fires gas or high-explosive shells at ranges up to 3,000 meters. These mortars are fired by electricity, so that all of them can be fired simultaneously. Thus their moral and physical effects are very great when an adequate number has been concentrated. The area affected, though restricted of course, is enveloped in an immense cloud of gas which causes heavy losses if the defenders are surprised.

The concentration of these weapons must therefore be kept a strict secret, and they must be carefully camouflaged.

If high-explosive shell is used, it is desirable that the infantry attack should begin immediately after the explosion, so that its enormous moral effect may be exploited to the full. Of course these mortars can fire only once at the same spot, for the enemy will immediately bombard their emplacements, and it takes a considerable time to prepare these mortar batteries for a second round.

The direction and control of the artillery in

all these circumstances is a very difficult matter. On the one hand, especially in trench warfare, it is essential that the artillery be in a position to develop and concentrate all its power without any observation, relying solely on careful calculations and accurate artillery maps and giving due consideration to all errors. In this case, a single direction by one central authority is essential and this authority must assign the targets, decide the distribution and scale of ammunition and settle all questions of time.

On the other hand, it is often essential that all the subordinate commanders down to the gun captain should have a free hand to deal with targets which suddenly present themselves and act on their own responsibility, though in the sense and spirit of their general instructions, without waiting for orders, which quite frequently will never reach the individual officer. These demands represent extremes which may have to be observed in certain circumstances. Between these limits, however, there lies a broad sphere of the most varied artillery tasks in which the problem is to reconcile the demands of a central control and direction—of the lower units, at any rate—with that independence of the subordinate commanders

which special circumstances frequently make inevitable. It means that these commanders, right down to the gun captains, must have a high standard of tactical knowledge.

When we contemplate the whole range of artillery operations we shall very soon be convinced that the peace organization on which the training and tactical employment of the artillery was based before the war is quite unsuitable for modern conditions. The system of four guns to the battery has certainly proved sound. Six guns are required only in the case of the infantry-gun batteries, as these may have to be distributed in sections to the three battalions of the regiment. On the other hand, the separation into field and foot artillery has been seen to be a mistake. A number of natures which previously formed part of the foot artillery have become field artillery to-day, and are employed in exactly the same manner as the old field artillery. The artillery officers must be as familiar with the one as with the other. Both species must frequently be employed in one tactical unit under the same command. To the field artillery belong not only the field guns and light howitzers, but even the heavy field howitzers, the long 10 cm. guns, and to a certain extent the 21 cm. mortars also.

Only the heavy flat-trajectory and high-angle guns, i. e., 13 cm., 15 cm., 21 cm., 30 cm. and 38 cm. guns and the heavy mortars with a caliber of 28, 30 and 42 cm., are in a category by themselves. These are employed on specialist tasks in particular circumstances, and generally speaking play no part in open warfare. It may be questionable whether the 21 cm. mortars also do not fall into this category, as in certain conditions—e. g., in the roadless regions of Russia—they cannot be employed in open warfare. On the other hand, in France they were in use during the whole war and frequently employed in conjunction with the field artillery. It will therefore be advisable to constitute special battalions of 21 cm. mortars, count them as part of the field artillery, and leave them behind only when the road system is particularly bad.

In all other respects it would be advisable to let the field artillery regiments comprise field-gun and field-howitzer *Abteilungen*,[2] and also assign an *Abteilung* of heavy field howitzers and 10 cm. guns to each of them, so that all the officers and men can be trained indiscriminately on all these guns. The regiments thus formed will be part of the division. Other regiments,

[2] An *Abteilung* is a group of three batteries. (Tr.)

comprising long heavy guns and heavy field howitzers, would form corps artillery and be under the orders of the corps commander who would also direct and control the mortar batteries.

It would be best for the anti-aircraft batteries to be assigned to the divisional and corps artillery. Further, all batteries will be equipped with machine-guns, either for defense against aircraft or for dealing with infantry attacks at short range. It must be anticipated that in trench warfare a very much larger artillery force will be required than for open warfare. In open warfare it will be essential for the corps and the armies to have an artillery reserve at their disposal, and our peace organization must bear this requirement in mind. In trench warfare, on the other hand, it is essential that the armies, army groups, and G.H.Q. itself should have a large artillery reserve, so that the artillery center of gravity may be shifted as circumstances require. These reserves must comprise field artillery regiments and anti-aircraft guns also. The necessary material must be brought up, and the required officers and men must be duly trained. It is therefore possible that the divisions will have more artillery regiments than they can use in ordinary

circumstances and open warfare, and this because these units must provide the necessary reserve in time of war. In any case, as compared with former times, the artillery of the field army will have to be increased much more than the infantry.

As regards long-range guns and the heaviest howitzers, it would be best to form them into mixed battalions as a special and independent arm under an Inspector-General. They should be assigned to corps and divisions for special maneuvers only.

No special tactics are required for this heavy artillery. It must know how to move about, get into position, shoot and coöperate with the other arms, particularly infantry. In this last department nothing like enough was done before the war. Even for the field artillery tactical operations can be reduced to the simplest form. Of course it is necessary in open warfare that batteries and groups should know how to move about safely and smartly, and how to get into position. For the rest, good shooting is all that is required. Shooting with direct observation at short ranges must be practiced very frequently in the closest coöperation with the infantry. This applies not only to the infantry-gun batteries, which are permanently

attached to infantry regiments, but to all field-gun batteries without distinction. Finally, far greater importance than hitherto must be attached to the independent action of the subordinate commanders. All section commanders and gun captains must know how to control and direct fire and must have reached such a standard of tactical training that they can take over the duties of the post above them at any moment and without hesitation.

Artillery material must be simplified as much as possible. The demands of the war have led to the introduction of many new natures which did not correspond to the changing circumstances. Great mobility (therefore the minimum of weight), long ranges and a rapid rate of fire, combined with very simple construction and ability to stand the hardest wear, are the absolutely essential properties which every gun must have. The ammunition wagons also must be constructed to stand hard wear. Motor transport must be used as largely as possible for this purpose, and produced on the scale required.

Fresh education is required in the matter of ammunition, which must be simplified as much as possible to meet all the eventualities of war with its changing requirements. In the course

of the giant conflict, as I have already said, shrapnel was driven out of use almost entirely by high explosive for the reason that in mass production it is not possible to manufacture really reliable time-fuses. Under normal circumstances of production it will recover its old importance. On the other hand, special attention must be devoted to the production of a shell of a particularly high penetrating power for use against tanks.

III.—Cavalry and Aircraft

If I deal with cavalry and the air force in one chapter my reason is that the functions of the former have to a certain extent been taken over by the air service. The mounted arm has changed its character very materially. In trench warfare it has practically ceased to exist as cavalry. Mounted troops are helpless against the long fortified lines of the enemy. They can be used only as a police force behind the front. Apart from infantry patrols, the duties of reconnaissance have been almost entirely taken over by aircraft, though the activities of the latter are certainly supplemented by the work of spies and secret agents. Yet these activities are subject to the great disadvantage that aircraft can work only in more or less fa-

vorable weather, and are as good as useless for this purpose at night or in dense fog.

At night, movements by railway and, in some circumstances, the position of villages and camps are all that aëroplanes can usually distinguish. It is only when flying very low and at short distances that it is possible for aëroplanes to light up the area they wish to reconnoiter. On the other hand, in good weather aëroplane reconnaissance is often able to show better results than cavalry could ever have done. The whole area occupied by the enemy can be photographed from the air. This makes it possible to fix the position and organization of the enemy's system of defenses in the greatest detail. Further, it is possible to observe and photograph from the air the movements of trains, the position of stations and rolling stock, aërodromes, the size and approximate capacity of camps, magazines and ammunition depots, the emplacements of hostile batteries and the presence of tanks (either directly or by distinguishing their tracks on the roads).

Of course the enemy will do his level best to conceal all these establishments from aërial observation, but if the reconnaissance is really careful and systematic it will often be possible

to make out preparations for a hostile attack, the increase or decrease of the enemy's artillery, the arrival of reserves, and similar preparations, and thus render the commanders the most valuable services.

But just as the cavalry found the field for reconnaissance open only when they had driven off the hostile cavalry, the air force also will frequently be in a position to carry out this task effectively only when the supremacy of the air has been fought for and won. The enemy will not only attack our reconnoitering machines whenever he has the chance, but he will also frequently patrol the area himself over his own lines to prevent our machines from breaking through, and he is certain to take the offensive himself in adequate force to find out what he requires to know about his opponents.

As I have said elsewhere, it is the function of the chaser squadron to fight the enemy's machines and to clear the way for the reconnaissance machines. For this purpose they are constituted in tactical units, the strength of which is not, of course, fixed by rule. The largest unit is the squadron which may consist of four to six flights and is in charge of a commander. The flight, which normally consists of fourteen machines, is subdivided into chains of

six to eight machines. The employment of a whole squadron always indicates the intention to destroy the largest possible number of hostile machines.

The duty of the squadron-commander is to lead the whole squadron, organized as a single formation, to fight the enemy. The commander himself, who always flies lowest in order to be seen by all the machines, arranges that he has, e. g., one flight each on his right and left; another follows behind, while the fourth is echeloned in height. Fixed tactical forms have not yet been developed and even the strengths of the individual tactical units will vary with the number of the machines and the personnel available. If the squadron meets a hostile force the action, which is always offensive, will break up into a number of separate duels. In these fights everything practically turns on getting above one's opponent, attacking him with the sun behind and shooting only at close quarters (there must be no hesitation about closing with the enemy) in order to be certain of hitting. After a successful action the squadron resumes its original formation round the squadron-commander who has been circling over the scene of battle.

If the squadron meets a hostile squadron

which is flying higher, it must attempt to entice the enemy to come down and give battle, and then rob him of the advantage of height by skillful climbing. On the other hand, if the squadron meets individual hostile machines flying below it, only one machine should dive down upon the enemy, or in case of emergency it may be helped by one other at most. The squadron itself must remain at its original height and not be induced to come down, as otherwise it would find itself in a disadvantageous position with regard to any other hostile formation which came up later.

In the individual duel everything turns on attacking the enemy from behind, and the enemy will do everything in his power to avoid being attacked from that quarter. With good climbers like our latest Fokker machines,[3] the enemy can also be attacked advantageously from below and behind. Against hostile balloons the best effects can be obtained with organized units and in coöperation with heavy artillery. Whole groups of balloons are attacked simultaneously, and their beds bombarded by heavy long-range guns to prevent the balloons from being promptly hauled down. Isolated machines will often be able to surprise and destroy

[3] I cannot say whether they still represent the latest type.

a balloon by making skillful use of the clouds.

The same principles which apply to the squadron naturally hold good for smaller units which act independently. The offensive, first and all the time, must be the dominant note in air tactics whether a large formation or a single machine is concerned. Success depends upon it far more than in fighting on land. The war has proved it up to the hilt. It may often mean that a considerable number of flights—drawn from adjacent fronts also—have to be concentrated in a certain area so that the supremacy of the air may be secured, come what may, at the decisive point.

Some such systematic concentration must be carried out particularly for a defensive action and it is, of course, indispensable when an offensive operation is intended, for in this case the control of the air at all altitudes must be secured beyond dispute both before and more particularly *after* the infantry assault. It will thus be necessary to keep back reserves of chaser squadrons in order to deal with enemy counter-attacks. A single command of the air forces is necessary under all circumstances. Success in the air will make it possible to reconnoiter much more thoroughly and accurately, and fulfill in increasing measure the other duties

of the flying arm, for the air service has taken over the rôle of cavalry in another department and in trench warfare is alone in a position to perform it—I mean harassing the communications of the enemy.

In trench warfare the cavalry can never get behind the hostile front, while aëroplanes can fly over it and attack the enemy's lines of communication, troops marching behind the lines, camps and aërodromes, dumps, stations and railways, and this either with bombs or machine-gun fire. These attacks can be far more successful and carried much farther behind the hostile front than in the days when this duty was assigned to the cavalry. As a rule these attacks will be carried out by bombing squadrons which have a very great radius of action and usually work by night, though by day also against nearer targets, and then generally under the protection of chaser flights.

Cavalry cannot intervene as such even in battles in trench warfare so long as these have not led to a complete rupture. But the cavalry effect of surprise, if not its methods of operation, can be obtained by the battle flights. These machines which, as we saw, are specially equipped for action against ground targets, can dive down (of course under the protection

of chaser squadrons) unexpectedly from high altitudes, sweep the enemy's trenches, troops in action, columns on the march and batteries in action with machine-gun fire at the shortest range. These attacks can be directed not only against the enemy's front line but also against defense works farther back and reserves as they arrive. In this way very material assistance can be rendered to the infantry in their hard struggle, and the situation will often be saved. The machines must come down very low, ignoring the enemy's fire altogether, if they are to make good use of their weapons and spread terror and confusion in the enemy's ranks.

Armor protection for the most important parts will materially facilitate this task. Thus the machine can be employed for attack as a kind of cuirassier of the air. On such occasions it will be a great advantage to organize the air forces into battle squadrons, each with a special task. As tactical units they will be sent into action where the decision is being sought either in attack or defense.

In trench warfare the cavalry can participate only when it is dismounted. They will be employed exactly in the same manner as infantry, and must be equipped and organized

accordingly. The horses will be left in safe places while the men will be organized in regiments within which the squadron forms the tactical unit. The peace training of this arm must provide for their employment dismounted, for even in open warfare their dismounted rôle will play a vital part. In other respects open warfare, which will mark the beginning of a campaign or succeed a victorious rupture of the enemy's front, will make quite different demands on this arm from those of trench warfare. Its peculiar characteristics will then again play their full part. Of course mounted fighting—by which I mean shock tactics—will be limited to a few exceptional occasions, as I pointed out even before the war, of course without being believed. It is only the patrols on both sides which will continually get to close quarters.

On the other hand, the strategic functions of this arm will become of vital importance. The speed of the horse will be used no longer for attack but for rapid strategic maneuvers. In this department an independent force of cavalry, properly handled, will obtain great successes of much strategic importance. Its main function will be to attack the flanks and rear of the enemy during a battle, cut his com-

munications as the operation proceeds and cause confusion behind the hostile front. In action itself cavalry will usually fight dismounted and with the assistance of the auxiliary arms assigned to it. Mounted fighting will take place only when it meets the enemy's mounted cavalry, or when it falls by surprise on hostile troops in flight, or finds a transport column on the march without escort. These will certainly be exceptional occurrences and dismounted fighting will be the rule both in attack and in defense proper.

These considerations must determine the tactical uses and therefore the organization of this arm upon which they are based. The form of action requires that a tactical dismounted unit must be the foundation of the whole organization. Every two squadrons, which number about 150 men when dismounted (apart from patrols and orderlies, etc.), must therefore form the tactical unit under the senior captain or a staff officer. The cavalry regiment must consist of at least ten squadrons in addition to the reserve squadron in order to form a dismounted battalion with a total establishment of about 750 men. The larger formations also must have a proportional establishment. The brigade must consist of two or three regi-

ments, so that it can constitute two or three dismounted battalions, while the division must have three brigades, so that it can represent a serious fighting force even after detaching one brigade. Both brigades and divisions must be fully equipped with the auxiliary weapons and indeed on such a scale that each brigade forms an independent tactical body. The most vital requirement is that mounted troops should have machine-gun squadrons, if possible one to each regiment. This is particularly important, as the light machine-gun, being difficult to carry on horseback, cannot be used. The machine-gun squadron must be able to develop a really serious fire-power. The cavalry formations must also receive a strong force of artillery, if possible light field howitzers of special construction because the uses of the latter are far more varied than those of guns. Adequate ammunition must be taken by a large number of ammunition columns. Under all circumstances it will be necessary for every brigade to have a battery which is permanently attached to it, and the divisional commander must have a group of three batteries at his immediate disposal.

Provision must also be made for the requirements of trench warfare by equipping the

cavalry with light machine-guns. A large number of men must therefore be trained in the use of this weapon even though it cannot be carried about permanently in open warfare. The force must have a large number of columns for bringing up the necessary fodder and reserves of material, and it will be advisable to form special escort squadrons to protect the columns on the march and, at the same time, perform the duties of close reconnaissance. Thus and thus alone will a sufficient freedom of movement be secured to the whole force. Another function of these escort squadrons will be to requisition food supplies and fodder from the country itself. As it will usually be impossible to rely on getting supplies from the rear, it will be particularly important to make the fullest use of local resources. The escort squadrons must therefore not be too weak, and may be trained as mounted infantry, as mounted fighting is most unlikely. If all these duties, and particularly requisitioning and protecting the transports, had to be performed by the fighting troops themselves their fighting strength would soon be very seriously reduced.

The same considerations apply to distant reconnaissance, which experience has shown absorbs a very large force and puts a strain

on the horses which is out of proportion to the results obtained. The cavalry must be relieved of this burden if it is at all possible. Here again the air force proves a suitable substitute. For purposes of reconnaissance flying units must be attached to the cavalry and formed and organized in such a way that the necessary aircraft can be assigned even to detached brigades, though they must all be under the division for common operations. In view of the speed of the aëroplane that will almost always be possible, just as it will be feasible to establish suitable aërodromes under the protection of the mounted troops. These aëroplanes must reconnoiter the country ahead and on both sides of the cavalry so thoroughly that the latter will always be safe against surprise or attack by a superior force when on the march or otherwise.

If such an aëroplane detachment is to follow the cavalry permanently it must be particularly mobile, for it also has to perform the duty of spotting for the attached artillery. This aim can be achieved by the provision of adequate motor transport. The commander of the flying squadron or an Air Force liaison officer must always go with the commander of the cavalry force. The cavalry formation must also be followed directly by a column of motor transport

carrying fuel, tents, equipment, wireless apparatus and guards for the aëroplanes, as well as motor cars and motor cyclists. These vehicles must remain where the cavalry formations (corps, divisions, or brigades) fix their headquarters.

In choosing these points (and the requirements of the attached flying units must be borne in mind for this purpose) the country will have to be reconnoitered beforehand, and the sites selected indicated by certain signals agreed upon by the individual cavalry units. There must certainly be a landing ground close to the officer in command of the cavalry, and it would be desirable that aircraft should be able to land near to divisional and brigade headquarters as well. For the rest, orders and messages would have to be conveyed by wireless or message bags dropped from aëroplanes. The movements of the flying detachment must be by stages on orders from the commander, and must be determined by the progress or the intended strategic employment of the accompanying cavalry formation. This reconnaissance from the air certainly does not relieve the cavalry of the duty of close reconnaissance or looking after its own safety, but

it takes over the cavalry function of distant reconnaissance, except on those days on which no flying is possible owing to the weather. Even that is a very valuable advantage.

Lastly, a cyclist battalion or a force of infantry in horsed or motor lorries may be attached to the cavalry. On the other hand, it is not advisable that it should be accompanied by infantry or *Jäger* on foot, as that would materially restrict its mobility. For although the "marching day" should not be too long for several successive days, if cavalry is to be fit to maneuver at a critical moment, it is able to cover very long distances very rapidly. It may, perhaps, be said that to give independent cavalry divisions the strength I have suggested involves an unnecessary burden on its strategic mobility, because obviously it is not an easy matter to provide so large a force with everything it requires. I do not share that view. In these days of mass armies, wherever great results are aimed at a great force must always be employed. A weak force fades away before the powers of resistance now displayed by even quite small detachments, and in enterprises such as we have been discussing its strength is soon exhausted. On the other hand, the authorities concerned with the supply of food and

forage to the troops may always rely on finding large supply depots in the rear of the hostile armies, as no modern army can move without them. Living on the country was a feature of past wars, and will be possible only in quite exceptional circumstances in future.

There are certainly a good many critics who are so impressed by trench warfare that they consider large-scale cavalry operations impossible under modern conditions. I need only refer these doubters to our campaigns in Russia and Rumania and the operations of our army cavalry during the campaign of 1914, in which the independent cavalry force performed remarkable feats, and could have done even greater things if it had been strong enough. As an example I need only mention our breakthrough at Slocow, in the summer of 1917, when it would unquestionably have been possible practically to destroy the armies opposed to us if—as had actually been planned—a strong cavalry corps had been sent out in the enemy's rear. It would be easy to multiply similar instances.

Unfortunately, we were compelled by circumstances to transform our cavalry very largely into dismounted troops, and thus to weaken even the divisional cavalry very seri-

ously. At the last there was only one weak squadron to each division. That is far too weak, even for trench warfare, in which it has the duties of police work behind the front and supplying mounted orderlies. One squadron is hopelessly inadequate for open warfare, in which it has to perform the tasks of close reconnaissance, orderly duties, requisitioning and so on, in addition to providing flank protection and intervening in the action where circumstances require.

It would certainly be a mistake to replace cavalry by mounted infantry—apart from the escort squadron, to which we have already referred. For distant marches and successful and effective raiding, efficient and skillful cavalry are an absolute necessity. Further, only cavalrymen can really keep their horses fit in the long run. Forming mounted infantry units is nearly always a half measure and has had little success, even in the Boer War, where the English used them on a large scale. The methods of dismounted fighting must be exactly the same as with the infantry. Here again the enemy's fire will compel the attack to be organized in groups, while everything will depend on refraining from attacking formidable strong points frontally and leaving them on one

side, so that they can be captured by envelopment. In this case the attacker will strive to break through at the point of least resistance, and leave the capture of strong points to the infantry waves coming up behind. Batteries will have to accompany the attacking troops directly, with a view to breaking down obstinate local resistance by artillery fire. Distribution in depth is just as important as in the case of the infantry.

In trench warfare particularly, the methods of dismounted cavalry will be determined by the same considerations, as in the case of the infantry, but it will be otherwise in open warfare, because, in this case, cavalry will seldom be employed in a purely frontal attack shoulder to shoulder with the sister arm. The commander will endeavor to make the fullest possible use of the mobility of this force. He will send out his cavalry from the wings against the flanks and rear of the enemy, and thus strive to strike him in the most sensitive spot.

In the action itself the commander will endeavor to make his frontal and flank attacks react upon one another and thus, by envelopment, reach that goal which can be attained only in a purely frontal action by distribution in depth. In this case the distribution need

not be so deep as in the purely frontal attack. At the same time the flanks and rear of the attacking cavalry must be protected against surprise from approaching hostile reserves by reconnoitering squadrons thrown out far ahead. Indeed, generally speaking, it will be possible to contemplate employing such a mass of cavalry only after previous reconnaissance has established that there are no hostile reserves in the vicinity. If their approach has been discovered it is the business of the cavalry to place itself across their path or keep them from getting nearer to the battlefield by attacking them in flank.

In affairs of this kind the cavalry will have to coöperate with the flying arm not only for reconnaissance purposes but in the action itself. Battle flights can not only introduce their attack on the marching columns of the enemy, but support it very effectively. Bombing squadrons can deal with hostile batteries emplaced behind the battle-front or advancing in the open, or they may be used against ammunition depots or columns on the march. In every kind of operation in open warfare the systematic coöperation of cavalry and aircraft will be very useful.

If we ever see cavalry battles in the grand

style again in some future war (which is not altogether impossible), it is certain that there will be no question of the so-called "three-line" tactics with its supports. Even before the war it could be seen that these fighting methods and maneuvers were entirely out of date. Unfortunately, it has had an unhappy influence upon the development of the cavalry arm, and led it into false paths in spite of all warnings.

Under the conditions of to-day there can be no question of putting in the division as a tactical unit, even in a cavalry action, in view of the effects of artillery and machine-guns. It will first be necessary to try and neutralize the hostile batteries and machine-guns with one's own artillery, and then send out one's brigades and regiments with individual commissions in such a way that they can execute a flank movement as much as possible out of range of the enemy's fire before they actually open their attack. In maneuvering they must advance in separate columns and concentrate for united action only when they reach the battlefield. The object will again be to envelop the enemy, and can alone bring victory, as a frontal attack in close order will only lead straight into the enemy's fire and present it with the most splendid target. The coöperation

of the various columns can be secured by communication through aircraft as well as by fixing the rate of the advance beforehand.

In the attack itself, which, as a rule, will be only against hostile cavalry, as far as circumstances permit the cavalry will be divided into two lines, the first being considerably the stronger of the two. The enemy must never be allowed to outflank them. If circumstances make it at all possible, the cavalry commander will have a reserve at his disposal, and in any case he will provide himself with artillery support and operate in such a way that without exposing himself to the enemy's fire he will get the latter under his own guns before he gets to close quarters with cold steel.

This is a lesson which I did my best to bring home, both in theory and practice, even before the World War. Unfortunately for the cavalry arm, I preached to deaf ears. At the beginning of the war particularly, our attacking and mass tactics cost our cavalry very serious and utterly useless losses in both men and material. The war has justified me at every point, and to-day there is reason for fearing that we are going too far in the opposite direction by completely underestimating the value of cavalry as such, and expecting nothing more from its strategic

activities simply because it was so often used wrongly in the war. It would be a great disaster if this view gained ground.

IV.—Fortifications, Engineers and Railway Troops

The art of fortification is so essential a factor in the conduct of modern operations that it must be regarded as an element in the tactics of all arms. Indeed, it is impossible to imagine an action without the use of the entrenching tool or the other technical engineering resources. In trench warfare all arms must be familiar with methods of fortification. The batteries must know how to provide themselves with wire and defenses in order to be able to deal with hostile infantry or tanks which have broken through. In trench warfare the cavalry fights exactly like infantry and therefore requires the same technical training. The infantry itself must be in a position to construct its defenses without assistance, and call in the engineers only as supervisors in the heavier technical work, such as concrete construction, tunneling, etc. In case of emergency, moreover, the infantry must know how to do *everything* necessary unaided, ordinary trench-digging and wiring, for instance.

Nevertheless, unusually difficult technical works, for which a specialist training is required, must remain the province of the engineers. They alone can do the heavier species of bridging, whether with proper engineering apparatus or only with improvised material. They or the railway troops must blow bridges up when required, as is so often the case in war. Mining is itself a special service within the compass of engineering. So is pontoon work, while all pioneers must be trained in temporary bridging as must the auxiliary pioneers in the infantry, i. e., infantrymen who have had a special training in the necessary pioneer work.

But even if the art of fortification has thus become the common property of the troops to a certain extent, the fact remains that the technical engineering problems of field warfare have increased so immensely in number and significance that the engineering arm has become very much more important and must be strengthened in comparison with the other arms so that it can relieve the infantry of many technical engineering functions and thus release it for its proper work of fighting.

On the other hand, it must be realized that in future there will be no fortifications in the true sense of the word.

Even the greatest fortified cities can be bombarded by the long-range artillery of present times without the attacker's being compelled to sit down to a proper siege. The fire of long-range flat-trajectory guns can be reënforced by the bombs of bombing squadrons which can attack the fortress from great altitudes, while the defense measures, such as anti-aircraft artillery and aircraft itself, can be no certain protection against such attacks. Even a ring of forts at a considerable distance from the town cannot save it from bombardment by long-range guns. Indeed, these forts offer the most favorable target to the attacking artillery, for even the strongest reënforced concrete and armored turrets at the disposal of the defending artillery cannot withstand the effects of heavy high-angle fire. They will be destroyed in a very short time, and cannot prevent the attacker from gaining access to the town itself.

Antwerp, the strongest fortress in Europe before the war, was able to hold out only twelve days.

Thus the fortress ceases to perform its true function of being a safe depot and center for war material and the civil authorities, as well as a defense for important strategic points, such as river-crossings, railway junctions and

so on, for a considerable time, even though the field army is temporarily compelled to leave it to its fate. Neither Paris nor Metz would have been able to hold out as long as they actually did in 1870–71 if they had been attacked by modern artillery, even if they had had the same resources for defense as Antwerp had in the last war. To-day the only value of Paris as a fortress is that it would compel its assailant to concentrate and deploy a large force of artillery. After that concentration was complete it is absolutely out of the question that it could hold out for any length of time when once it had lost touch with the field army.

It may perhaps be suggested that the case of Verdun is a proof to the contrary, for Verdun certainly succeeded in defying capture. That case, however, has no weight. In the first place Verdun was never out of touch with the army. It always formed a sector of the French line. Moreover, it was not the fortifications which saved the fortress from capture. It was the extraordinarily favorable configuration of the ground, which was particularly suitable for defense and offered the defenders shell-proof cover in subterranean tunnels which, combined with the general military situation, made it possible for the town to hold out. Notwithstand-

ing all this, it never performed its function of a safe supply center.

Nor did it protect an army or even its own garrison, though that is what was expected of a fortress in former times. On the other hand, it was itself protected and saved by the field army. These are great differences, and practically reduce its value as a fortress to nothing. The real forts and armored works were soon destroyed by the attacker's artillery and played a relatively subordinate part during the whole siege.

There can be no possible doubt that fortresses have lost their value in face of modern methods of attack. Even before the war I prophesied that that would be the case.

Under modern conditions it is quite impossible to protect railway junctions, river crossings, and similar important strategic points locally, either against artillery as soon as the latter has got them within range, or against aircraft, for anti-aircraft guns are a very limited protection.

In actual practice such points can be protected only by the *offensive* both on land and in the air, an offensive which keeps the hostile columns at such a distance that they cannot reach the object to be destroyed with their artil-

lery, while the bombing squadrons are attacked with the greatest vigor *before* they appear over their target on their nocturnal visit. Important dumps can be protected in this way only, and further, by being established at places which the enemy does not suspect and which are as safe as care can make them against discovery from the air.

In future, whenever one side is compelled or elects to stand on the defensive, fortresses will be replaced by field fortifications in selected areas. The defenses will be planned on the same lines as defenses in trench warfare, but in certain circumstances will be permanent constructions, as will be the case in trench warfare also where time and other conditions permit.

Whether it will be necessary even in peace time to construct permanent defenses on part of the frontier on the principles of field fortification, and then make them as safe as possible even against heavy artillery, must depend upon political, military and local conditions. Such defense works would undoubtedly impose upon the prospective enemy a concentration of artillery which would mean a loss of valuable time.

As regards field fortifications themselves, the most varied and fundamental changes have taken place during the war. While certain

arrangements which had proved their value in some circumstances were generalized, it often happened that instructions were issued which had no place in other circumstances. In actual fact it is quite impossible to draw up a manual of universal application; all orders must be determined by the special circumstances of each particular case. Thus only quite general principles can be elucidated, for their execution in practice depends upon the nature of the ground in which the work is to be done, the amount of ground-water, the question whether the area before and behind the selected position is overlooked, the material and labor resources available, the prospective natures and strength of the enemy's artillery and other offensive arms, and finally the purpose which the trench system is intended to serve, i. e., whether it is to be defended merely for a short time or held for a considerable period.

The plan of construction must be determined by all these considerations. If there is time geologists will be called in to help, so that the nature of the soil and the question of water can be considered from the outset. It is of the very greatest importance to dry the trenches by a suitable system of drainage. I proved the truth of that myself both in Russia and France. In

countries where there is much ground-water it will be impossible to dig very deep and it will often be necessary to keep renewing the parapets. Where the trenches are on a declivity the water will frequently pour into them from above. In such a case appropriate steps must be taken to drain it off. If possible, hydraulic engineers must be called in to advise. The trenches must always be sited in such a way that they do not easily collapse under artillery fire. The profile must be determined accordingly, and a method of revetment adopted which avoids the scattering of splinters when a direct hit is scored, as is the case with revetments of planks for instance.

In view of the effects of modern artillery, covered-in trenches with loopholes from which to fire—the system so freely used by the Russians—must be emphatically condemned. It is also important to make the trenches as invisible to the enemy as is possible and particularly to protect them from observation from the air. The field of fire must be adequate. It must be possible to fire over the wire in front, as otherwise the bullets will cut through it. Lastly, the trenches must give the men, if at all possible, weather and shell-proof cover from which they can quickly get to the fire-step. By

"shell-proof," however, I mean only cover against 15 cm. shell at the outside, as protection against heavier calibers is only possible under particularly favorable circumstances. Further, there must be safe communication with the rear if in any way possible. The more formidable the hostile artillery fire to be anticipated, and the more the whole trench system is exposed to the enemy's view, the more essential does it become to provide cover in the shape of shell-proof dug-outs.

In some circumstances it may also be necessary to construct the defensive system not as a continuous line of trenches but as a series of strong points. In that case it will be essential to provide safe means of communication between the individual strong points (though frequently such communication trenches can be concealed from view only by camouflage), and further, it will be necessary to establish second-line strong points, chessboard-wise, behind the gaps in the front series, so that when the enemy has broken through he will find himself faced with fresh centers of resistance.

If time and the available labor permit, rear lines or a series of strong points will be established even behind the continuous front-line system. In these resistance will be offered to

the enemy after he has broken into the front line, the impetus of his attack will be shattered, and he will be held up long enough for the counter-attack of the defender's reserves to make itself felt. These trenches or strong points will also serve the purpose of providing cover for local reserves.

The same principles apply in the case of the fortification of a deep defensive zone from which it is intended in certain circumstances to retire slowly, but fighting all the time, on a line farther back.

In many cases it is advisable to select a position on the reverse side of a slope which cannot be directly seen or observed by the enemy. But, to my eyes, this slight advantage is nothing compared with the great disadvantages of such a position. In the first place it is clear that the defender himself cannot see the enemy, and therefore is very liable to be surprised. For that reason posts have to be established on the crest of the hill in all circumstances, and their position is very unfavorable. Moreover, the advantage of not being seen directly is very small, at any rate in my opinion, for even a trench system on the (to the attacker) far side of the slope can be observed from aircraft and

often even from balloons at great heights, and thus brought under artillery fire.

In considering the proper method of constructing a system of defenses it will always be of importance to site the trench lines or strong points in such a way that they can give each other mutual flank protection, mainly by machine-gun fire. Continuous lines must be adapted to the ground and broken up in such a way that each part naturally secures the flanks of the others. Strong points must be established and adapted to folds in the ground in such a way that the area on front of each of them is covered by the fire of the adjacent works. The strong points behind must not only command the intervals between those in front, but also the area in front of the works in the advanced line.

As a rule the so-called tank forts will be at dominating points if possible, and so close behind the main line of defense that they can deal with tanks as they approach the latter or after they have successfully broken through it. The whole area which is likely to witness a tank attack must be commanded by them. In an emergency mobile anti-tank guns must be close at hand ready to render assistance. The position of the obstacles is of particular importance.

For these, barbed wire entanglements will almost always be used. The forward zone in front of the system of defenses will be protected by the deepest possible belt of wire, so that attacking infantry will be held up by it and exposed to the fire of the defender for as long as possible. Wiring may take very different forms. There may be wide belts of flat wire formed of closely interwined strands of wire which are carried diagonally across an immense number of stakes. Or there may be the so-called "Flanders' *chevaux-de-frise,*" which consists of a large number of high but only lightly strung wire fences, fairly far apart, and in this case also the iron or wooden stakes will be braced laterally by wire.

The flat entanglements represent a considerably greater obstacle to advancing infantry, but are easily distinguished by aircraft and thus betray the position of the whole trench system. They are also an excellent target for artillery and trench-mortars. The *chevaux-de-frise,* on the other hand, cannot be seen so easily and are more difficult to destroy by artillery fire, though they do not present anything like so great an obstacle as the flat entanglements. The method to be chosen will thus depend upon the special circumstances. Where

the entanglements can be concealed from the enemy's view—even from the air—the flat wire system will always be chosen. Lastly, between the different belts or zones of wire it will also be possible to put trip wire, wire netting, or traps which can be scattered freely over the ground, and are intended to catch the advancing infantry who cannot see them.

The method of erecting the entanglements is also important. It has already been said that the defender must be able to fire over the entanglements, particularly those consisting of very dense wire. It is also important that they should be sited and distributed in such a way that they can be enfiladed by machine-gun fire along their whole length; they must also leave broad gaps through which the outposts can withdraw if a retirement is decided upon or from which one's own infantry can emerge for an attack.

These gaps must be easily recognizable by one's own troops. On the other hand, it must be made very difficult for the enemy to distinguish them and it must be possible to close them at a moment's notice with appropriate material ("knife-rests" and portable entanglements), which are always kept close at hand. Further, they must be open to accurate fire

from their own machine-guns even at night. These machine-guns must be kept under shell-proof cover in all parts of the defensive system, but for firing purposes they must be brought out into the open so that they have a free field of fire in every direction.

It is particularly difficult to place obstacles against tank attacks before the lines, as tanks simply crush down wire entanglements and climb parapets and trenches without any difficulty. The main means of defense against tanks are therefore the fire of anti-tank guns and the fact that they can be attacked by infantry with special anti-tank rifles and concentrated charges, and by machine-guns with special ammunition. If a large number of them are employed close together it is not difficult to put them out of action. Further, local obstacles may also be used against them. Deep and wide shell-holes in which ground-water of at least one meter in depth has collected cannot usually be crossed by them, nor can very marshy ground and trenches of more than four meters in width and proportionately deep. Roads can be closed by strong concrete barricades if the tanks cannot get around them. They may have gaps to let ordinary transport and artillery through. Lastly, large areas may

be sown with tank mines, which function in such a way that they are harmless to ordinary traffic but explode when the heavy tanks cross them. This kind of work is best carried out by the engineers, or they should at least direct and control it.

Thus the pioneers have a complex of duties, and even though in my view there is no room for them in real fortress operations, their activities have assumed a much larger scale and require far more men than hitherto. Whereas in former wars they were engaged on special tasks, they have to coöperate permanently with all the fighting arms to-day, primarily in trench warfare, but also in open warfare and particularly in the offensive.

As I have already said, the result is that it is necessary to strengthen the pioneer arm in relation to the other arms and also to train all pioneers in the solution of *all* the problems (even the most complicated ones) which will face every single formation in every part of the great theater of war. That does not mean, however, that every man in the pioneers must or need be trained equally for every specialist service. For example, mining and flame projectors are a branch of the service in which single groups only of every company of

specialists need be trained, while pontoon-bridging, erecting defenses and obstacles of all kinds, blowing up bridges, concrete work, draining trenches and similar duties must be mastered by every member of the pioneer arm.

The construction of roads over bad ground is another department of field operations with which the pioneers must be familiar. It is very often necessary to bring up bridges and other emergency material in order to make some wilderness of shell-holes passable, even for heavy artillery and ammunition wagons, in the shortest possible time. Of course this work will generally be carried out by the ordinary labor troops, but the pioneers must direct them and perform certain special technical duties.

Bearing all these things in mind, it is absolutely vital that a strong pioneer battalion of three or four companies be attached to every division and be permanently at its disposal. G.H.Q., moreover, will require further special pioneer troops which it can distribute to the individual army groups and armies, though they need not be used equally at all points, for the construction of rallying positions in the rear, bridging great rivers, the rapid establishment of lines and blocking trenches which the divisional pioneers could not manage by them-

selves. The bridging of the Vistula at Ivangorod and the construction of the Siegfried Line are examples of these special tasks which the divisional engineers could not, or were too busy to perform. This force of army pioneers must, of course, be established in peace time. At the beginning of the war the fortress-pioneer battalions (originally intended for employment in attacks on fortresses) were assigned these duties. As this will be unnecessary in future it will be advisable to form corps pioneer battalions in addition to the divisional pioneers, and these corps battalions will be available for special employment in time of war.

The railway troops, the importance of which has increased very considerably, must be under the sole orders of the Supreme Command, the Chief of the General Staff or a Special Inspector both in peace and in war. The restoration of railways which have been destroyed, the construction of new broad-gauge lines, and the establishment of field railways have assumed a scale in comparison with previous wars which no one ever suspected. In trench warfare particularly all troops must be connected with the great railway arteries by a complex of field railways if they are to be kept permanently supplied. This requires a large force (much

larger than hitherto) of railway and railway-construction troops, the maintenance of which will not be exceptionally expensive, as the men will be employed on railways and railway-construction in peace time, work which will best fit them for their duties in war.

For the purpose of forming railway units, and pioneer units as well, in selecting the men in peace preference will be given to those from callings which are a special training for their duties in war. Of course pioneer and railway troops must be trained in the simplest form of infantry fighting. They will remain soldiers under all circumstances, and this work must never be assigned to civilian labor.

There is one point, however, on which we must be quite clear. The uses to which pioneers and the troops associated with them can be put have become very much more important. Their numbers have grown very considerably, but, whatever happens, this arm can no longer perform one task which was formerly their principal function—protecting the frontiers against the enemy by fortifications. Of course the pioneers, in conjunction with the other arms, can delay an invasion for a time, but they cannot save the area which they are to protect against shelling by the enemy. Long-range

guns—the ranges exceed 120 kilometers even to-day—will ravage the area far and wide, and carry ruin and destruction deep into the enemy's country. There is therefore no option to take the offensive or stand on the defensive. We *must* take the offensive if we are to protect our own country against hostile shelling.

Of course the defender also can bring up long-range guns and thus, to a certain extent, revive the conditions of bygone days. But the situation will be quite different. In the first place, the side which determines to conduct operations on its own frontiers will concentrate its guns in peace time or, at any rate, prepare their emplacements. The enemy can do the same for the matter of that, but it will never be possible to discover the emplacements so completely that the guns will be unable to inflict the most serious injury on the enemy's country before their positions are ascertained and they can be dealt with in such a way that they can fire no more. This will be particularly true when they fire from alternative emplacements which will be difficult to find even with the help of aircraft.

Thus he who intends to fight within his own frontiers is bound to expose a large area of his own country to devastation by the enemy's

long-range artillery, while he who wishes to avoid such a fate must carry the war into the enemy's country. In other words, all future wars will start with offensive operations, and the side which attacks too late or first succumbs in the attack will abandon his country to his enemy who *cannot help* gradually turning it into a desert, for that is the inevitable consequence of trench warfare which seems unavoidable to-day. Woe to him who attempts to fight within his own frontiers at the outset! By his own action he will lose his chance of keeping war and its horrors from his own country, and will only bring down ruin upon a large part of it.

Thus, even though the pioneer arm has become much more important, and exercises a great influence on the fighting methods of the other arms, it is none the less dominated by the artillery and gives the offensive greater latitude than had ever been thought. Its tactical value has increased, but its strategic value can be felt only indirectly. To think of and arrange for the offensive is thus essential under all circumstances.

Even from the political point of view the pioneer arm makes itself felt with great force. The days of the small state which protected it-

self with fortifications are over. From the military point of view it can exist only if associated with some great state, and political circumstances alone can protect its neutrality. A Belgium is possible only if bound by the closest ties to one of its great neighbors, and Holland, Switzerland and Poland will not survive after their larger and more powerful neighbors have ceased to have an interest in their continued existence.

CHAPTER III

ATTACK, DEFENSE AND THE INITIATIVE

In his immortal book on war, Clausewitz has said that the defensive is the stronger form of action. In saying that, he did not, of course, mean to deny the immense material and moral advantages which the initiative and the offensive mean in military operations, but simply that in the then conditions of armament—assuming equal numbers on both sides—the defender had the advantage, which was undoubtedly true. It is equally true to-day. But a very different answer must be given to this question when we look at it from the point of view of generalship. For even in Clausewitz's time the decision was determined by issues quite other than the theoretical superiority of the defense.

Had not Frederick the Great, in his heroic struggle, which even to-day remains unique, shown how the weaker side could cope victoriously even with enormously superior foes, by renewing its attacks again and again and

firmly maintaining the initiative which forces the enemy to follow one's lead and calls incalculable factors into existence? In this sense the offensive—to-day perhaps more than ever before—is certainly the superior form of generalship, though not the superior form of action, and indeed for the reason that a rigid defensive without offensive reaction is possible only in quite exceptional cases. The methods and resources available to the defense have increased enormously, but certainly not on the same scale as those of the offensive.

Modern artillery can destroy any defenses that have yet been constructed; where it is in a position to subject a defensive system to a continuous and concentrated destruction-fire, no infantry in the world is in a position to maintain itself. It will simply be destroyed. The men can do nothing but try to keep alive in shell-proof dug-outs—until the latter get hit—and can use their weapons only when the enemy's fire is "lifted" farther on in order to make way for the infantry attack and prevent the approach of reserves.

It may now be objected that the defender can have an equally powerful artillery, and therefore is in a better position to annihilate the enemy's infantry when he attacks than the

attacker to deal with the defender's, who are under cover in fortified lines. That is true enough. The advantage of the attacker is the fact that by keeping the initiative he gets a great start over his opponent, and can therefore concentrate unexpectedly a *superior* force of artillery against the sector to be attacked, so that he will be in a position to neutralize the artillery of the defense before it can be reenforced and also subject the enemy's defenses to so annihilating a fire that no resistance can be offered. It is the chance of concentrating a superior force of artillery and infantry, as well as tanks for the offensive, and then attacking by surprise which is the main reason of the superiority of the offensive.

In addition there is the prospect of overcoming the hostile obstacles with tanks, concealing the attacking infantry from the enemy's view by artificial fog, and on top of this there is the great moral effect which offensive operations always have. Nothing is worse for a soldier than to have to sit down idle under an annihilating fire and simply contemplate death without being able to take any sort of action. All weaknesses of character then make themselves felt, and fear steals upon even the stoutest heart. If the soldier can only do something

himself, fight, shoot or make an advance, the mental strain becomes more tolerable, and this often follows the moral exhaustion of even the greatest heroism. It is the attacker who primarily enjoys this advantage of action, but it is so important that the defender also must attempt to secure it for himself, at least partially. As a *pure* defensive appears to be more or less hopeless against an opponent who is strong in artillery, unless the defender has the protection of shell-proof cover, the latter must keep strong reserves behind his front line in order to counter-attack and throw back any of the enemy's troops who have broken through.

Of course these reserves will have to go through the enemy's destruction-fire or barrage, and are thus bound to suffer heavy losses, but they need not be exposed permanently to the enemy's fire, and will naturally have every inducement to go forward as quickly as possible in order to get out of it. Here is the opportunity for the defender's tanks to make their presence felt. At the moment of his successful break-through, the attacker can have only a few guns in a position to be dangerous to the defender's tanks, and these should thus be able to help their infantry in the counter-attack. Of course this will not be easy, even then, be-

cause the defender has to deal with a superior artillery which can fire at the tanks from a distance.

But if the attacker in trench warfare gets his superiority only through surprise and his tanks, this advantage will probably be increased in open warfare, for in this case it is not merely a question of an unexpected concentration of superior forces behind the front, but of preparing and carrying through unexpected enveloping and similar movements. The opportunities for surprise are greatly increased. Of course in open warfare the opportunities for reconnaissance are much greater than in trench warfare, for where the two opponents are fighting in detached army groups, the latter expose their flanks to reconnaissance, and reconnoitering by aircraft can be supplemented by similar activity on the part of the cavalry, while in trench warfare there is absolutely no room for cavalry as such, and all that can be ascertained is what is going on *behind* the hostile lines. Yet even here the advantage is with the attacker.

In open warfare the possible strategic maneuvers are very numerous and varied and frequently difficult to discover. Further, the strategic movements which are the preliminaries to

the battle are executed relatively rapidly, and therefore deprive the defender of the possibility of taking prompt counter-measures, even when he has discovered the enemy's movements. Lastly, in open warfare the army is tied to the lines of communication available, and unexpected troop movements are usually more difficult to carry out—especially from the point of view of the necessary supplies of ammunition and food—than in trench warfare in which an extensive and specially constructed network of roads and railways, field railways, depots for ammunition, food and engineering materials are provided to meet any circumstances, so that all troop movements are facilitated to an amazing degree.

When we turn to consider the general strategic situation, the superiority of the side on the offensive appears to be even greater than on the battlefield itself.

Over immense areas, such as those between the Swiss frontier and the Channel, or between the Baltic and the Black Sea, the attacker can choose the precise spot at which to attack. He can demonstrate at any point, and thus try to deceive his opponent as to the real sector in which the attack is coming. The defender must be ready for the attack everywhere. The only

data available to him in divining the enemy's intentions are the directions in which the enemy's attack would probably produce important results, and secondly, the form of the enemy's railway communications. For the rest, he is left to the reports of spies, the statements of prisoners and deserters, the results of tapping telephones and telegraphs, and reconnaissance from the air. The reconnoitering machines, however, have an extremely difficult task, as all artillery movements are carried out by night, and all battery positions and defenses are concealed as far as possible from aërial observation.

Further, it is almost impossible to distinguish between dummy and real defensive systems. The defender will often come to the conclusion that an attack is imminent because he notices increased railway movements behind the hostile front, but here again he may be deceived by what are really demonstrations. Thus, in actual fact, both we and our enemies repeatedly succeeded in concealing preparations for intended attacks, while on other occasions the intention to attack was discovered in time, because sufficient care had not been taken to conceal it and the attack failed as a result of prompt counter-measures.

Thus, while the attacker knows pretty accurately beforehand at what points he must concentrate his forces and make his preparations, the defender is compelled to assemble his reserves of men, ammunition, and even food in some circumstances, at certain central points. Further, he must always have his rolling stock and motor transport ready for moving these reserves the moment the enemy's intentions have been definitely ascertained. Any error in moving reserves may have fatal consequences. In such a case, to meet the emergency he may be compelled to adopt such measures as unprepared troop movements, breaking up larger units, and similar improvisations which are often disastrous. Such measures only too easily throw the systematic and regular troop and supply movements into confusion—those movements without which a modern mass army cannot be handled at all. They may also have a serious effect on the *morale* of the troops which, as we shall see, is to-day a more vital factor than ever before.

Lastly, the superiority of the offensive lies in the fact that *it alone* can bring the decision. Wars cannot be won by pure defense. Even a successful defense can mean superiority only when it gives the defender a chance to pass from

it and seek a decision by the offensive. A defensive victory is never anything but a half victory, and the hope that the enemy can be forced to make peace by attrition, i. e., the exhaustion of his forces, is in its nature a snare and a delusion. For no one can by a pure defensive compel the enemy to consume his troops if he does not, for his own part, attempt to force a decision by the attack, and thus prove once more that only the offensive can bring victory.

If one side believes that the enemy's forces can be worn down to such an extent that the foe will be compelled to make peace from sheer exhaustion, he must keep on attacking him time after time, in order to compel him to use his troops. As long as it is left to the option of the enemy, whether and how far he will sacrifice his men, it is obvious that no end of the war can be in sight, and it is for the enemy to say what form that end shall take.

Professor Hans Delbrück—a well-known armchair strategist—has invented the term "attrition strategy" for this negative species of operations, and seems to think that he has said something very clever. In actual fact, of course, there is no such thing as a strategy which avoids the offensive in order to obtain a vic-

tory by wearing down the enemy. Defensive strategy means rather that one side wishes to delay the decision because it no longer feels capable of forcing that decision itself; but in doing so it renounces the prospect of military victory, and leaves the enemy to decide how long he will continue his efforts. The issue of the war will then be the result of factors which are not the outcome of its own operations.

The wars of Frederick the Great are only a superficial proof of the justice of Delbrück's view. The enemies of Prussia certainly shied at a decision by force of arms, and tried to win the war by exhausting their foe. In the end, however, they lost it. They were exhausted themselves sooner than the King. The latter turned their hesitation to fight to good account, and therefore gave battle only when he found himself compelled to do so. The war would have ended victoriously for the Austrians and their allies long before had they made up their minds to try to obtain a victory in the field.

Thus, in all circumstances, the offensive is the inevitable preliminary to a victorious decision in war, so far as this is dependent entirely upon the course of military operations and is not affected by changes in the political and economic conditions which prevail at the

beginning of the war. Even in the strategic defensive it is always the vital factor. It is the soul of generalship in all times and places, and in the last resort the whole art of war consists of initiating a decisive offensive under favorable conditions. This fundamental law of war is, of course, unaffected by the fact that one has frequently to adopt an attitude of pure defense, at any rate in a strategic sense. In those cases, "delaying" action is adopted because one wishes to create favorable conditions for the offensive at some other point or in some other way.

In this connection I need only to refer to "the Law of Numbers," which I discussed very fully elsewhere.[1] It is not numbers in themselves which bring victory in war; the vital factor is the possibility of concentrating numerical, mental, and moral superiority on the decisive battlefield or theater of war. Where that appears feasible, war is justified—from the purely military point of view. Where it does not, a favorable decision can be expected only as the result of circumstances which do not depend upon military successes.

Thus, if one desires to be justified from the military point of view at the beginning of the

[1] *Vom heutigen Kriege,* Vol. I, II, 2, p. 97.

war, it must be probable that so decisive a victory can be won over the enemy that the latter loses his power to bring about a decision which has any prospects of success for him. Such a victory can, as a rule, be secured only by the offensive and will, in any case, have to be exploited offensively if it is to lead to the goal of the operations.

This law, as it has developed in the course of time, naturally holds good even under the conditions of the World War, and determines the relations between defense and offense. Defense is justified exactly to the degree that it enables the defender ultimately to pass to that offensive which is necessary under all circumstances. This truth must be borne in mind in military operations of every kind, and to-day more than ever before, as the offensive, both from the strategic and tactical point of view, has undoubtedly proved the stronger form of strategy and action.

But if the offensive is the soul of operations, even when it cannot be pursued directly in all circumstances, and if it remains an *arrière pensée,* even in the defense, the logical result is that in war it is always essential to try to keep the initiative in one's own hands. This is a principle of the art of war which is gen-

erally recognized, and I am saying nothing new in repeating it. The initiative brings the advantage—an advantage which cannot be overestimated—that the enemy is compelled to conform to one's own actions, and one is not bound to conform to his. As long as one avoids an attitude of passive expectation and is always engaged in some enterprise or other, or in creating a new situation, the enemy is compelled to conform to one's actions and keep changing his own plans, which are based on a given situation, simply because this situation has been modified by initiative action. Thus one keeps the upper hand in all operations, and gets the start of the enemy both as regards place and time.

Of course it is very important to distinguish between the initiative and the offensive. Because one side seizes or maintains the initiative, it need not always be contemplating the offensive. Even in the defensive the initiative can be kept, or an attempt made to recover it when it has been lost. I have already said that a pure defensive can never lead to positive victories, and frequently will not result even in a purely defensive victory. Thus every defense requires a corresponding offensive, either to retain or recover the sectors attacked by the

enemy, or to be initiated at some other point where the enemy has perhaps weakened himself, or the defense decides to seek the decision. This is one of the ways in which a lost initiative can be recovered, and the enemy forced to conform to our own actions.

On the other hand, the defender is certainly not bound in every case to bear the shock of the enemy's attack at the point which the latter has selected. Where a loss of ground is not particularly vital, the defender may withdraw, if he wishes, to another position which is tactically better and has perhaps been established and fortified beforehand. The defender will thus bring his foe into a position which is unfavorable to him from the tactical point of view. Such a retirement may also be combined with a decisive offensive. In this case the defender will prepare the counter-attack behind the lines on which he is withdrawing, and then launch it by surprise against his unsuspecting enemy. The object will always be to keep the upper hand, and by unexpected action compel the enemy to conform to one's own movements, and to impose upon him that course of action which we desire. In the long run, a decisive battle, that is, an offensive or a defen-

sive followed by a counter-attack, is always the result of initiative action.

A purely local defense is permissible only where the defender is fighting for time against a superior enemy in a region which is particularly favorable to defense, and his flanks also are secure. Such cases are conceivable, e. g., where the defender is hoping for the subsequent intervention of an ally or the release of troops for the offensive from some other theater. They will, no doubt, be frequent. On the other hand, in theaters in which the decision is being sought they are inconceivable, or, at any rate, permissible on the smallest scale only, and solely in local actions.

CHAPTER IV

THE PRINCIPLES OF THE OFFENSIVE

Our old Prussian "Training Manual" states that the best form of tactical offensive is the simultaneous attack on the front and flanks of the enemy. This statement is true only of small affairs in which fire from front and flanks can be concentrated locally against an opponent consisting of a single body. Otherwise it is fundamentally false.

In attempting to enunciate a principle we must assume that both sides are equal numerically and the conditions are the same for both. If that is so the defender—thanks to his frontal superiority—can successfully hold the front attack with forces weaker than those the attacker can employ, and at the same time concentrate *superior* forces to protect his flanks. He will thus be superior in the flank action, which is decisive by virtue of its direction, and is bound —*ceteris paribus*—to win. This is a matter of mathematics. The advantage which the offensive has in modern war is not great enough to

outweigh this advantage enjoyed by the defense. The defective teaching of our "Training Manual" erroneously assumes the superiority of the attack either in numbers or in fighting value.

Thus the only formal rule we possess in the sphere of tactics is wrong, and in the sphere of strategy there are no rules at all. This is indeed quite natural, for the circumstances under which a strategic attack can or must take place are so varied that apparently no rules of universal application can be deduced from them. From the tactical point of view also, it is today apparently impossible to give definite rules after the war has assumed forms so different as open warfare on one side, and trench warfare on the other. On the other hand, there are certainly a few principles which apply both tactically and strategically, and from these the form of attack in every single case can be deduced by paying due regard to all special circumstances.

One of them may be put in the words of Frederick the Great, and runs: *"He who tries to protect everything will protect nothing."* The other was put by Field Marshal Hindenburg, in the words: *"A General must never fight without a center of gravity."* The expressions sup-

plement each other, and are the product of the same spirit.

At first sight the words of Frederick the Great seem to refer to pure defense. When we look into them more closely, however, we soon realize that their character is offensive and nothing else. It is only by reading an offensive meaning into "protection" that the sentence has any strategic sense at all. If we try to protect a long front by a pure defensive, but leave some sector unprotected, the enemy will, of course, break through at this point, come in on the flanks and rear of the front which is held, and thus reap vital advantages. If King Frederick, who had to protect both East Prussia and Silesia, for example, had decided to let East Prussia go in order to stand on the defensive with his whole army in Silesia, he would undoubtedly have lost the war in a very short time. But if, without dividing his forces between the two provinces to be protected, he decided to beat his enemies in Silesia by a resolute offensive, in order that he could then launch another offensive in East Prussia and win further battles there before his opponent in Silesia had recovered, he could certainly protect both provinces, although he abandoned one of them tem-

porarily. His expression, "He who tries to protect everything will protect nothing," is thus fully justified.

If he had distributed his army over both provinces at the outset, in all probability he would not have won a single battle, as he would have been too weak at every point. Thus we realize that the meaning of the great King's words is approximately the same as that of the Field Marshal's. In modern language we should say: "I first make Silesia the center of gravity of my offensive and at first give up any idea of protecting East Prussia with adequate forces in order that I may transfer my center of gravity back to East Prussia when I have obtained my victory in Silesia." Thus, at the beginning of the World War itself, we saw Silesia and Posen practically drained of fighting troops and defended by a weak frontier force only, while the real fighting force was concentrated in East Prussia, in order to take the offensive exactly in the sense of King Frederick's words and Hindenburg's remark about the center of gravity.

It was in this spirit that the German Army was grouped at the beginning of the war. Weak forces only were held back for offensive purposes in the East; the main mass of the army

was concentrated against France, in order to deal the first decisive blow against that country. There is certainly reason to ask whether the process of transferring troops on the West to East Prussia was not begun too soon, and, indeed, before the decision in France had been obtained. We certainly achieved our purpose of driving the enemy from East Prussia and the other provinces in the East. On the other hand, we paid for it by being too weak to make strategic use of the tactical victory we had already gained in the decisive Battle of the Marne, and, as we can see to-day, this failure was partially responsible for the issue of the whole war.

It is impossible to say, once and for all, how long one theater of war may be left uncovered or protected with weak defense troops only in order that victory may be secured in some other theater. It depends upon all manner of circumstances — the enemy's intentions and strength, the importance of the areas to be evacuated to the operations in general, and the chances of transferring troops to the threatened regions in time. As a general principle, it may be said that an area may be surrendered for any time, as long as the enemy is not in a position to extract such great advantages from

his occupation that no victory at another point, however decisive, can ever be sufficient compensation.

We may take an example from the opening phase of the World War. If we had not reenforced our army in East Prussia from the West, we could certainly never have won the Battle of the Masurian Lakes, and should gradually have been forced behind the Vistula. But we could have held up the Russians for a long time before they seriously threatened Berlin, which had, of course, to be held at all costs, being the kernel of our whole resistance. As a result of that course, in all probability we should have won the Battle of the Marne in brilliant fashion, overthrown France once and for all before England could raise her army of millions, and almost certainly have imposed a speedy peace on that side. From the purely military point of view, even after the Battle of the Marne, we should have been in a position to save Berlin, drive the Russians from our country, and bring the war in the East to a victorious conclusion. Of course, this cannot be proved mathematically, nor is it intended to be any criticism of our strategy, which can be judged only in the light of a thorough knowledge of all the circumstances. It may,

however, serve as an example to illustrate a military principle. It is the law of interior lines, which decides such a case, and only forms a special case of our teaching on the subject of the center of gravity.[1]

This teaching is important, both from the strategic and tactical point of view. It is, or ought to be, the *fundamental principle of every attack.* Like Epaminondas at Leuctra and Mantinea, Frederick the Great availed himself of it down to its last corollary in the oblique order of battle which he used at Leuthen and Rossbach. On these occasions he made the attacking wing his sole center of gravity and even went so far as completely to "refuse" the other, i. e., he did not get to close quarters with the enemy's front, but compelled it by his flank attack to change front and deploy afresh. Then, when the wing he had attacked was thrown back, he attacked and defeated the front in the very middle of its maneuver.

Of course this method cannot be used on all occasions, and Frederick the Great himself did not attempt to do so. But there must always be a center of gravity whatever form the attack may take. In open warfare the matter is comparatively simple, though the possibility of

[1] *Vom heutigen Kriege,* Vol. II, III, p. 89.

the enemy's retreating must be borne in mind. For the rest, the main blow of the attack will always fall at the point where success would do the enemy the greatest damage.

For instance, if circumstances compel us to make a frontal attack in all cases when we are dealing with long fronts, we shall strive to obtain victory by breaking through, and either make our main thrust where a rapid success is most probable, or direct it against a part of the hostile front from which the rest can most easily be rolled up or the enemy's line of retreat threatened.

If we are in a position to envelop one of the enemy's wings, we must try to select, and initiate our operations against, that wing from which the enemy can most easily be forced off his line of retreat. We shall then bring up our main force to that point. The same rule applies in the case of double envelopment, the maneuver which was carried out in the Battle of Tannenberg, for example. Here, again, the vital thing is to be particularly strong at the point where the enemy's communications lie, and to throw in one's main force where the enemy is mainly concerned with endeavoring to escape envelopment. At Tannenberg this was the Russian right wing.

Of course such dispositions will not always give ideal results. Even Frederick the Great was able to fight only one Leuthen and one Rossbach under particularly favorable circumstances, for in open warfare the battle develops out of maneuver, and in the course of maneuvering one cannot always foresee what the situation will be when the two armies come into tactical contact. With modern mass armies it is even more difficult than before, when troop movements could be improvised on the battlefield itself. This is no longer the case. It is even more necessary, therefore, for the modern commander to try to realize from the general situation how matters will develop, and then distribute his troops, select his line of attack, and arrange his communications in such a way that he can place the center of gravity of his attack at the decisive point when the critical stage of the struggle is reached.

In trench warfare it is different. Here the first business is a purely frontal attack, even in cases where it is intended to try to envelop some salient in the hostile line. In this case the center of gravity is obvious. The main thrust will be delivered not against the front of the salient, but against its points of junction with the rest of the line, so that if the at-

tack succeeds the hostile troops within the salient can be taken in flank and rear, and in certain circumstances be completely cut off. For the rest, the center of gravity of the attack will be determined by the configuration of the ground and with reference to the enemy's field of fire and the direction indicated by the general situation. But we must always concentrate our main striking force at one special point, and avoid distributing it equally over the whole front.

The detailed dispositions to be taken on these occasions must be discussed later when we come to the special subject of the break-through battle.

CHAPTER V

THE SOURCES OF POWER

NUMBERS play an extremely important rôle in war, and are the element which determines the issue of battles and wars where other factors are equal on both sides and equally skillfully used. As a matter of fact, these suppositions, on which the overwhelming importance of numbers is based, are never true in practice.

The factors, apart from that of numbers, which determine the issue of war are very varied from the point of view of their importance. The tactical value of the troops, differences in armament, the skill of the high command, the driving force behind the war, the influences of the *terrain,* the national character of the people at war—all these are elements which increase or diminish the value of numbers, and in some cases even make numerical superiority a positive danger. Their influence, however, varies greatly at different times, and it therefore seems important to inquire where the true sources of power are to be found under

modern conditions. A war lasting years has taught us to distinguish between appearance and reality, and to recognize what is really vital in the changing flood of superficialities.

Is there any one whom history has not taught that the great leader can often inspire his troops to perform the most extraordinary feats? Is there any Prussian officer who does not know that the spirit and the moral force of the troops are far more valuable than mere masses? Is there any one who has not learned from our Wars of Liberation and the National uprising of 1914 what mighty forces can be released by an idea, and what heights of heroism can be reached by an enthusiasm such as that which carried our young men to battle, death and victory, singing patriotic songs. Yet, here again, values which are apparently purely mental and moral, are dependent to an extraordinary degree upon external circumstances. As a rule it is a question of mass suggestion, for independent moral forces, springing from inmost feelings, are peculiar to very few men. The mass is swayed by, and entirely dependent upon, external circumstances. Of course the heart of the masses must certainly be capable of enthusiasm. The last war has brought that home to us in full force.

Think of Goethe's words:

> Begeisterung ist keine Häringsware,
> Die sich aufheben lässt für viele Jahre.

It can flame up for a moment, fire the imagination of the masses and sweep them away with it, but it seldom survives the strain of a difficult and serious situation, unless it is kept alive by success and nourished by great dominating personalities. Only a few heaven-inspired individuals are capable of a lasting enthusiasm which can survive even disaster.

For instance, who would have thought it possible that the same nation which was swept away by enthusiasm and flocked to the colors in 1914 apparently prepared for any sacrifice, would allow itself, after but a few years of war, to be governed solely by its own personal appetites and interests, although the enemy had never appeared within our frontiers, except in East Prussia? Who could have dreamed that it would lose all its patriotic pride; in short, that it would descend to those depths of degradation to which it sank in 1918? War profiteers and workmen, paid much more than their deserts, wallowed in material luxury, and cared naught for the honor of the State or the future of our Fatherland. But the hydra of party poli-

tics raised its hideous head and cooked its miserable supper at the fire of public calamity.

Indeed, it could never have been clearer that patriotic enthusiasm is no firm or healthy soil for a proud plant like military power. No idea which contains the secret of our destinies, however great, is likely to raise the masses—the German masses, at any rate—to permanent heights of military achievement. Of course there are still thousands of proud hearts which will not bow before the general degradation, but they lack the courage to act, and their desires remain a force from which the life has departed, the last twitches of a dying man.

Yet, at the present time, the moral resolution of the whole nation has far greater influence on the moral strength of the troops than it had in days of old. In the days of Frederick the Great the army was to a certain extent a foreign body of State, and, even in its outward forms, war seemed to be no business of the whole nation. The citizen was never touched by the fortunes of war, except where the enemy invaded the country. The state of public opinion at home, and the nation's tendency to despondency, could not, however, affect the army directly, as there was only a loose connection between it and the mass of the nation, and there

were practically no letters to and from the soldiers in the field. It is quite otherwise to-day. The spirit and feelings of the public at home reach the souls of the troops in millions of letters, and strengthen or shake their will to victory and their soldierly confidence.

Thus the nation at home is largely responsible for the spirit of the men in the field, and therefore for the military efficiency of the army. The *morale* of the nation, however, is a fluctuating element, which may have an inspiring and encouraging influence on the army at one time, and a harmful and depressing effect at another. Thus it is essential to do all that is possible to neutralize this element of uncertainty. The greatest efforts must be devoted to preserving the spirit of the army against such ruinous influences without depriving it of the impetus which a wave of heroic resolution at home is able to communicate to it. Unfortunately, the latter depends to a high degree upon military success and the amount of suffering and privation which war imposes upon the civil population.

The noblest and truest ideas lose their hold on the masses the moment they cease to be associated with victorious progress and begin to be accompanied by a certain measure of per-

sonal sacrifice. It is then that the bad elements in the nation—the political agitators who desire to exploit public needs for personal purposes, and the weaklings who try to communicate their cowardice to the masses in order to relieve their own nerves—obtain a paramount influence only too easily, and their teaching stifles the call of duty and honor. How this process developed in Germany at the end of the war is known only too well.

The soldier, in the noblest sense of the word, must also avoid being dependent upon victory. He must not allow his sense of duty and will to victory to be shaken by even the greatest disaster. Indeed, he must thrive on misfortunes, like Prussia after Grossgörchen and Bautzen. The harder his task, the greater the danger and perhaps the crisis, the stronger must his will be, the greater his exertions, the more faithful his service. Nor must the soldier allow himself to be influenced by bodily sufferings and privations. He must not let himself hesitate over the performance of his moral and military duty, even though it seems to exceed the limit of what is humanly possible. The determination to conquer must survive everything! That in itself is an inexhaustible source of strength

which leads to final victory in spite of every possible disaster.

Of course it will not be possible—as everything human is imperfect—always to attain such a standard of soldierly independence, particularly under the conditions of a national war, in which every man fit to bear arms is called up, and it is difficult to develop that firm, internal cohesion which marks a real unit among newly-formed regiments which are recruited from the most varied elements. But there is always some method of influencing the spirit of the men in the desired direction if these regiments are used with some reference to the situation and the circumstances.

The first, and by far the most important of these methods, is discipline—i. e., training the men in those habits of discipline, order, subordination and obedience which must become second nature to them. It must work like hypnotic suggestion. The soldier must regard it as an almighty power which governs him like an iron law. It will be infinitely more effective when in the mind of the subordinate the customary obedience is associated with trust in the officer, a conviction that the latter is his best friend who is always looking after his welfare, setting him a good example, and in diffi-

cult and dangerous situations knows best what should be done.

These two elements, automatic obedience and unshakable confidence in the superior, form the basis of discipline. They must be the cement which holds the unit together, even in the worst crisis. In the last resort the efficiency of troops depends upon the brotherly loyalty of the men to each other and their trustful devotion to their leader, especially where they have received a proper military training. For if the soldier is to defy every danger and be able to meet all demands made upon him, he must, in addition to giving his officer obedience and confidence, show that he has completely mastered his profession. He must also have a certain degree (relative to the possible scope of his duties) of tactical judgment, which enables him to act on his own responsibility when his leaders have fallen, and he is left to his own resources. Otherwise he will not be equal to the tasks which the moment may require. Knowledge and judgment will then engender that soldierly confidence which will and is bound to be an enormous aid to efficiency.

Where the largest possible number of self-confident and yet well-disciplined and loyal men are to be found in a unit, the foundations for

the highest standard of efficiency have been laid. Unfortunately, these qualities by themselves are not enough to protect the troops against injurious influences from home. Of course the influence of officers who enjoy the confidence of their men will be able to do a great deal in this respect, but it is necessary that the troops shall be kept apart from the home country in a certain sense, and feel that their interests are not the same although they are a genuine national army.

They must develop a proud feeling of professional detachment towards the civil population. Such a feeling is absolutely justified. While the civil population at home, who are not directly touched by the war, have to bear a few, though serious, privations, the soldier is offering his life and facing countless dangers, often when suffering the greatest physical torments and trials. In many cases he has left his family behind in want and anxiety. There he is in the field, living in wet trenches or exposed shell-holes, far from friends and relations who might be giving him moral support, though often enough they only worry and torment him with their faint-heartedness and tendency to exaggerate their trouble. Undoubtedly he has the right to regard himself as a

being apart, the sole *real representative* of the nation and the Fatherland, and to look down with pride on those at home, who live in safety under his protection, and yet all too often grumble and groan and pay him back with words only, not with deeds.

The officers must devote themselves to cultivating this sentiment of soldierly self-conscience and keeping the troops alive to their own high calling. This is relatively easy in the case of old and famous regiments who have a great tradition, for in that case there is historic fame on which to build. It is far harder, however, in a war which, like the last war, summons the whole nation to arms, compels the formation of many new regiments, scatters the old solid officers' corps and fills their places with young and inexperienced officers of the reserve; a war which everywhere disturbs the old order, keeps all units in a state of flux and never permits the maintenance of higher units of fixed constitution. All this means that the higher officers, who have all had a long period of regular service and thus acquired a wealth of experience, must devote themselves unceasingly to teaching and helping their subordinates to influence the men in the right direction.

It is of quite special importance to train the N.C.O.'s also to be the standard-bearers of soldierly pride. Yet the corner stone from every point of view is the regimental C.O. What the C.O. is, that will the regiment be. This was proved over and over again in the last war, where battalion and company commanders were frequently inexperienced young officers. Even the youngest officers must be required to look after the material welfare of their men. That will contribute not a little to win the officers the confidence of their subordinates. It is perfectly astounding how much influence a matter like food, for instance, can have on the spirit of the troops. The prolonged shortage of potatoes frequently had an injurious effect on the spirit of even good divisions.

It is also important to give the troops now and then a real rest out of the danger zone and not get the last ounce out of them. If the officers go too far in that direction they may render the whole unit ineffective, while a rest, even if short, at the right moment will often do wonders and restore full efficiency in a surprisingly short time. It is particularly advisable for the higher authorities, who are only too fond of moving divisions hither and thither like chessmen, to devote the most careful attention

to this psychological factor. The moral attitude of men is frequently influenced by their physical feelings. Hunger, overstrain, or being kept continuously in the danger zone under the effects of the nerve-shattering thunder of the guns and the shells falling and bursting about them, have an influence which cannot be prevented and in the long run paralyze their moral powers.

Lastly, we must consider the influence which the commander in chief may have on the whole army. Just as the spirit of a regiment depends on the influence of the regimental C.O., the spirit of an army depends on the personality of its leader, which does not always make itself felt in victory only. There are subtle threads woven between the commander in chief and his subordinates. They cannot be seen, but they work with wonderful power. It is the unconscious force of suggestion of a great man which asserts itself here. This subtle influence is originally the effect of victory, but when once it has been firmly established it will survive even the heaviest disasters. After Kolin and Kunersdorf Frederick the Great's men worshiped him just as much as after his first brilliant victories, and the halo which Napoleon won on the battlefields of 1796 existed in the

eyes of his army even after the catastrophe of 1812 and the disaster of Leipzig.

Even under modern conditions this vital power of a great personality makes its presence felt, though it is not so easy to preserve it, because too many injurious influences from home assail the hearts of the soldiers with other and contrary emotions. The Battle of Tannenberg made Hindenburg the hero of the army in spite of all the victories which were gained by other generals, for the soldier has an extraordinary, even though only half-conscious, feeling for the power and influence of personality. Unfortunately the universal self-seeking and jealousy at home have raised their voices even against him, tried to undermine his influence with the army and thus shatter one of the pillars of our military power.

It is very necessary that a spirit of *esprit de corps* should be cultivated in the army, so that it will regard attacks upon its commander as an attack upon itself and refuse to yield to such influences.

It is not difficult to cultivate such a spirit in the units in the line. These evil influences usually developed first in the lines-of-communication areas. The troops employed in these areas are usually older men who have not been

subjected to military discipline for a considerable time, and they are commanded by officers who are sent to these formations because they are not quite fit for duty at the front. These officers are not always equal to their task.

In this department there are but few regular officers who always form the flower of the officers' corps, as the few officers trained for these duties in peace time are nothing like enough to staff the many new formations which have to be established for the transport of the army in case of mobilization. Thus, in this branch of the service many of the officers are not accustomed to handling troops and do not realize the needs of their men.

The result is that these lines-of-communication formations are often the breeding-ground of insubordination and of all the other bad qualities of an army.

We must devote the greatest attention to this matter in peace time. A good deal more will have to be done than has been done hitherto to train all these officers to be really effective leaders of men, in order that they may not have to learn this branch of their duties during the campaign itself. For we must be perfectly clear on one point: just as the efficiency of the troops depends primarily on discipline, disci-

pline itself is based on the capacity and efficiency of those in a position of command, primarily the officers, but in hardly less degree the N.C.O.'s, who are the natural connecting link between the men and the corps of officers.

The responsible task of all these leaders is to establish the foundation upon which the power of an army rests—absolute and automatic discipline; good training, which develops coöperative effort out of the conscious independent action of the individual; genuine soldierly pride, which springs from the consciousness of personal achievement and duty fulfilled and protects the unit against all injurious influences which assail it from outside; the devotion of all those in positions of command to the welfare of their subordinates, and the absolute confidence of the latter in those whose orders they obey; lastly, true patriotism, which enables the troops to fight for a great common idea and gladly to sacrifice their all for King and Fatherland.

In this respect we made a great mistake, owing to the relative shortness of all previous wars. We started the war with too many regular officers in the active units. They all rushed to the units at the front because they thought that this war would last only a short time like

other wars, and in any case they preferred to be there. Unhappily, large numbers of them were killed, and we missed them sorely in the later years of the war.

In future wars we must act with greater prudence in this respect and at the very outset adopt a measure which, unfortunately, we took too late—the formation of an officer reserve. We shall thus save ourselves a great unnecessary sacrifice of life, and we shall not get less out of the fresh troops than we did before. For the later phases we shall thus have a far better and more effective corps of officers. It will then be far easier to maintain the spirit of the troops, even on the lines of communication—that element which holds all the others together and can alone bring lasting victory. It is the element of absolute determination to conquer, firmly implanted in every heart.

CHAPTER VI

THE INFLUENCE OF POLITICS AND ECONOMICS

Wars like those waged in modern times are not fought with weapons alone, for politics, and particularly economics, play a far greater part than in the wars of bygone days. Of course the influence of politics made itself felt even in earlier times, and economics also have had an indirect effect. To-day, however, these two factors are consciously employed as direct weapons. This was certainly the case with our enemies; not with us, unhappily. The enemy not only tried to starve us out, but left no stone unturned to bring new enemies into the field against us.

To all appearances, we let this go on for years without making the slightest effort to meet it. If we knew what was coming our policy must be judged even more harshly. In any case, we allowed ourselves to be completely hoodwinked. We looked on quietly while Italy was being enticed away from us. We did not take it amiss that England, France, and Russia

entered into an alliance against us and drew North America on to the side of our enemies. We completely overestimated the stability of the Triple Alliance, the internal cohesion of Austria and the capacity for resistance of Turkey and Bulgaria. We did nothing before the war to strengthen these last two states. Without bothering ourselves with what was going on among other nations, or even noticing their feverish activity, we quietly pursued our peace policy, in the firm belief—for which there was no justification—that we should succeed in coming to a friendly arrangement with England and thus secure the peace of Europe.

We never thought of America at all at first. By conceding point after point we allowed our enemies to believe in our weakness, and thus simply provoked war instead of averting it. When we had a chance of making peace with Russia before the Russian revolution broke out, we declined to do so, completely miscalculating our chances of victory. Thus, in the judgment of history, we shall have the glory of having pursued an absolutely honorable policy and carried out the ethical teaching of Christianity. In the political sphere, however, we have been outrageously deceived.

Even in matters of domestic politics we hope-

lessly miscalculated. We despised the inevitable progress and credited the German nation with a capacity for resistance which, in fact, it never possessed. Right up to the last we underestimated the revolutionary elements which were at work among the people. Thus we stumbled into the war without any political preparation at all. Bismarck would have turned in his grave if he could have seen such a lack of proper precautions. Our political action was distinguished by an unprecedented poverty of ideas.

From the economic point of view also we acted equally thoughtlessly. We made no sort of preparation for the coming war. We never gave our ships in foreign seas timely warning that war was imminent, and of course we did nothing so obvious as to hoard supplies and enable our agriculture to make the necessary arrangements! From this point of view we were hopelessly surprised.

In view of the proved inadequacy of our diplomacy it is thus urgently necessary to examine the laws which must govern both this art and that of war, if a state is to maintain its position in the world. It is equally important to examine the economic situation to see how far it can be influenced by war.

The man who is responsible for directing the affairs of a great state must first know quite definitely what he himself wants and what the other states want. He must look at the matter from a purely professional point of view, and not in accordance with preconceived desires and ideas. He must accurately estimate the resources at his disposal and those available to the other states. In the first line, of course, he must consider military resources, as the political importance of any state depends upon its military capacity.

It is a common, indeed too common, error to assume that policy can do things of its own impetus and that it is an independent power. *In actual fact it can attain its ends only when it has the backing of a force of which the enemy state is afraid.* The circumstance that policy frequently achieves successes to which the real power behind it does not correspond is to be ascribed only to the fact that the opponent is deceived on this point, or that he regards the matter in question as not worth fighting about.

The main function of diplomacy is to produce or maintain that deception while securing one's own interests. From this point of view it is indifferent whether one's own power is concerned or that of another state whose interven-

tion is feared or threatened. Hence the disillusionment of diplomacy, which regards what is really due to mistakes or reluctance on the part of the opponents as a success of its own. Hence, too, its efforts to spread such illusions.

But if this point of view be departed from, and one side fails to deceive its opponent as to its real power, it will often suddenly find itself faced with a war, as Germany was when the World War began. Before we start a political game, we should fairly ask ourselves whether in case of need we are ready and willing to take up arms to attain our end. If that is not the case, or if the position changes in our adversary's favor as time goes on, we must change our course and save anything that can be saved.

That is the general principle and only superficially immoral. Of course it aims primarily either at hoodwinking the adversary or a preventive war, but both are justified. The first duty of every man is to his fellow countrymen. That must always be kept in mind. The necessary deception can be secured without a single untrue statement's being made. That is just where the art of diplomacy comes in. Prince Bismarck was an adept in this art. He is even now without a peer in the realm of great diplomats, and no one could possibly call his actions

immoral. The preventive war, also, is justified, because the sacrifices which are exacted by a war which was inevitable because the adversary *intended it* are nothing compared with those which will have to be made if such a war is lost. The World War has certainly brought that home to us forcibly enough.

It is true that in his *Gedanken und Erinnerungen* Prince Bismarck declared himself against preventive wars. On the other hand, he wrote this book in his old age, and his own actions were inconsistent with that expression of opinion. Indeed, his real greatness lies in the contrast. We must, therefore, not be afraid of distinguishing between the aging Bismarck and the man of action. It is the deeds of the latter only which are beacons for the great man's successors.

To continue, a good many successes can be obtained by diplomatic methods because the military power of each side is actually equal. In such cases success falls to the side which knows how to make the best use of that power, but behind everything the real power is there and is not forgotten. "Negotiations without arms are like notes without instruments," said Frederick the Great, and he was undoubtedly right. Thus the diplomatic game always

turns on real power or the appearance of power, and he who thinks that success can be secured by civic ideals will be bitterly deceived sooner or later. It is the nature of the average man to look after his own interests; he does not think of giving up something merely because it is right to do so or might be to the advantage of another.

War is nothing but the continuation of diplomacy by other methods. It is always purely a question of weighing the real or apparent resources (both our own and those of the adversary), trying to deceive our opponent, or spoiling his game and winning our own by threatening war or unexpectedly beginning it. In this game there is no room for generosity, and such an emotion would, indeed, be a crime against the nation. Where the threat of real power does not achieve its purpose, or the attempt to deceive is unsuccessful, war is inevitable if we intend to attain our ends, and then arises the question as to what is the relation between diplomacy and war when we have decided to appeal to the latter, the *ultima ratio*.

It is obvious that in every political affair we must be quite clear as to whether a war is possible if we do not succeed in settling the matter at issue in a manner corresponding to our

interests by the methods of peace. We must know whether we are willing to take up arms on behalf of those interests, whether we attach sufficient importance to the whole matter to make this extreme step necessary, and whether we have come to the conclusion that the enemy has decided to act in the same manner. In such a case we must make political preparations for war, and, if possible, in such a way that the enemy will notice nothing.

Of course it will be quite impossible to conceal the military measures which we consider it necessary to take, and which must be in keeping with the magnitude of the political aim in view. But it is otherwise with the political measures. In the case of the former it is always essential to avoid half-measures and leave the opponent in no doubt that we have decided to take the most extreme steps in case of necessity. The last two army bills which were passed in Germany before the war were half-measures, which could give the enemy no kind of misgiving and could be recognized as half-measures. They are fittingly described by the proverb, "Wash my fur, but don't wet me." The Government at that time was told as much in unmistakable terms, but the only result was that we were forbidden to repeat our objections.

But while the military preparations must be made publicly and with the greatest energy, and while half-measures in this sphere will have the effect only of encouraging the enemy, the political preparations must be carried on in complete secrecy. This is what our enemies attempted to do, though they did not hoodwink those who were not willfully blind. Of course we could not tell exactly what was going on, but we could certainly realize that serious plans were being made for a general attack on Germany. In these circumstances it was essential that we should consider war as at any rate possible, and act accordingly. We had to prepare for the war by making alliances.

Further, it is essential to prevent states from participating in the coming war by making concessions which must be kept secret. Thus, in the case in point, we ought to have concluded treaties with Turkey and Bulgaria, and no one need have known. We should also have tried to come to some arrangement with North America, which certainly would not have been impossible. The same course should have been taken with Italy and Rumania.

There were other political measures which could certainly have been taken, but about which it is impossible to form an opinion, as

all the facts are not known. In case of emergency, we ought to have decided on a preventive war if the whole existence of the State seemed in danger by our refusal to do so.

Thus, when it is possible that there will be war, everything must be done to prepare for it under the most favorable conditions, or the statesman must realize that he must give way altogether if he does not succeed in deceiving his enemy as to the true position.

But the task of diplomacy is quite different when war has actually broken out. It still has the duty of keeping other states from participating in the war. Indeed, it will make concessions to them corresponding to the advantages the enemy would derive from the entry of the state in question into the struggle. But this step must be taken only in agreement with the Supreme Command. In all other respects the only duty of diplomacy is to support the military with all its might. It must conform to their wishes entirely, and give up any idea of taking any step without consulting them. That is equally necessary, of course, in the case of affairs which may possibly lead to war—for there must always be a proper relation between the statesman and the general. But a breach of this rule never produces its effects more di-

rectly and immediately than in war itself. The military penalty follows the political mistake at once. Diplomacy must therefore confine itself to preparing the way for military victories and exploiting them, but only in accordance with instructions *to be given by the military authorities.* Where this rule is not observed, military and political measures might pursue the same aim and yet in a totally different spirit, and that might easily give wholly contradictory results.

The upshot is that, where possible, military and political direction should be in one hand, and for that purpose military and political functions should be combined in one person. That was the case with Frederick the Great. He knew how to reconcile the political and military influences in the conduct of war in the most wonderful way. This appears clearly from a study of his wars, although not a word is said about it in the official history of those wars published by the General Staff, a history which completely ignores the political aspect of Frederick's generalship and reads as if every action of the King were to be attributed to purely military issues and considerations.

No one else has ever enjoyed quite the same position as the Great King, and where that is

so the political authority—in old Prussia, therefore, the King himself—must know how to keep in the background and leave the military authority to decide what is to be done. The politician must unconditionally submit to the will of the soldier, for the combination of political and military action is the main object, and military requirements determine the political. The military leader must be selected accordingly, and where that cannot be done it is much better that some one less expert in politics should settle the broad lines of diplomacy than that the soldier and the statesman should work against each other.

As long as the war is in progress and there is no immediate prospect of a suitable peace, military victory alone must be pursued and everything else must be directed to furthering those efforts. If peace is in sight, on the other hand, it is again for the soldier to judge whether it is necessary to secure it by intensifying the military effort or whether it is better to adopt the diplomatic method, i. e., by making concessions. Only the soldier is in a position to judge. Not the least of the causes of Germany's downfall is the fact that this simple rule was not observed.

Thus it is simply foolish to require that

diplomacy must always be carried on with all the cards on the table. One might just as well ask that the strategist should always tell the enemy beforehand what are his intentions in his operations. It is perfectly obvious that diplomacy must always be secret simply because—apart from technical reasons for that course—if we did the opposite, i. e., made all our diplomatic arrangements *openly,* we could never be quite certain that our opponent or opponents would act as honorably as ourselves. We ought to have learned that at least from our downfall. Our enemies did not show their hands until the last moment, while we Germans made a point of concealing nothing from them. We must abandon that principle if we are ever to be anything in the world in future. It is not too much to ask that a reasonable government should enjoy so much confidence that the nation will draw the obvious inferences and assume responsibility for the results of its secret diplomacy.

It is hoped that by forbidding secret diplomacy the so-called "people" will be secured against the outbreak of war which, as a whole, they have not foreseen; but the fact that this is simply cutting off one's nose to spite one's face is wholly ignored. There is obviously no

security against anything while the opponent is given an absolutely free hand.

Nor must there be any indulgence in delusions with regard to domestic policy. We must know for certain what can be expected from our own people and what is beyond their powers. We must be quite certain that the great mass can never realize logically what the common welfare means; that it is certainly capable of a momentary enthusiasm for some ideal, but is never able to pursue that ideal with resolution and energy; that it is quite ready to make certain sacrifices, but, generally speaking, has its eye on material well-being only. The statesman who is working for the welfare of the whole body politic is not understood by the masses, and in some circumstances is therefore bound to use force to carry through his plans. This course requires a high degree of sense of duty and energy, and success alone can justify action which is superficially irresponsible and high-handed. For example, the French authorities took drastic measures when about seventy-five regiments mutinied, and yet in the long run their action proved necessary for the common good. Of course I know as well as any one else that the whole of French policy was based on the interests of the great financial

magnates, but in this case—when once the war had begun—their interests coincided with those of the whole nation.

The political head must therefore have the courage to take the sharpest measures against his own people if occasion requires. But before he can do so he must be well informed of what is going on among the people, so that he can intervene in time and prevent the ringleaders (for there always are ringleaders) from doing any harm. He must therefore be as well informed about the domestic situation as about the secret intentions and resources of the neighboring states. Indeed, it is the courage he displays in dealing with his own people which is the real hall mark of the great statesman.

It is just the same with the economic situation. Here, again, it will be necessary to use force when occasion requires. Of course it is impossible to be permanently prepared for all conceivable wars. But probabilities can and must always be borne in mind without trusting entirely to the enemy's sense of honor. The errors of this last course we can appreciate from the attitude of our present enemies, who have not the slightest idea of adhering to their own statements. We can also realize the foolishness of relying on the honor and enthusiasm

of mankind by considering what is happening with us at home now. There have never been so much stealing and dancing as at the present moment, in spite of the great national disaster.

Of course, in considering the measures to be taken, it is very material whether a country is wholly or partially cut off from the outer world, or not. To all appearances Germany certainly was. When Italy, France and Russia close their frontiers, the Northern neutrals are under the power of England, and in the East the poor communications of Turkey and the all-pervading influence of England cut off all supplies, Germany is left to her own resources, for it is obvious that she can make no use of her merchant fleet.

The situation is quite different for England. Supplies from outside can reach her as well as France. In return she supplies half the world with coal, while France has to rely mainly on imports. Submarine operations affect both states, and can certainly hinder the import and export of coal to a very material degree. This applies to Italy also, which is dependent upon imports for its food and coal, and cannot even exist without them. Such are the considerations which these states have to bear in mind when war becomes probable. Russia, on the

other hand, can never be cut off from Asia, though her world-trade can be interrupted, as it is carried on mainly through the Baltic. Lastly, Turkey and Greece are as good as dependent upon England, which will before long dominate the routes through the Mediterranean and into the interior of Asia.

Thus the states which more or less depend upon imports will do everything in their power to make these safe against submarines. Germany, on the other hand, just because she can be cut off from every form of maritime communication, must import a large number of things as soon as war is in sight, i. e., commodities which cannot be produced in the country itself. She must also adapt her agriculture accordingly. There is no need to say here what must be cultivated and what not. It is the business of the Government to discuss all this with the farmers, and the World War itself has given us the necessary finger-posts. All I will say is that provision must be made for the necessary food supplies and the indispensable raw materials.

For the rest, diplomacy must endeavor to keep the trade routes open, which is conceivable only if there is a complete revolution in our present system of alliances. Time will

show us what can be done in this respect. Lastly, the U-boat weapon must be developed to the highest pitch of capacity, notwithstanding the present peace conditions. That both this and the reorganization of the army are possible is proved by the years after 1806, in which 200,000 men were trained under the eyes of the French garrisons instead of the 42,000, the number permitted. This example is a further proof that diplomacy which sets out to do anything must be, so to speak, always on the offensive. Of course that does not mean it must be always aiming at war. On the contrary, it must never forget that its business is to preserve the peace, but it must always be active and always desiring and striving for something if it is not to be dictated to.

Thus diplomacy is subject to exactly the same laws as war. We must never lose the initiative and never give the other parties in the game a completely free hand to pursue their designs. Our own schemes must always interpose and cross the intentions of our adversary; thus keeping the initiative is the golden rule of diplomacy, and it applies equally to national economy. We must always be prepared for all eventualities and never let ourselves be sur-

prised. *"Toujours en vedette"* must be our motto.

Of course it would be a great mistake to be continually unsettling trade by apprehensions of war, as, for instance, by recalling all our merchant ships whenever there was the slightest prospect of war. That would mean sacrificing the present for the sake of a conjecture; but we must always know exactly what we want, as I pointed out at the beginning of this discussion. We must be clear at the outset whether we are prepared to let matters go to the length of war, and whether what is at stake for the enemy is great enough for him to risk a war also. When we have come to the conclusion that war is probable we must have the courage to take appropriate measures both in the political and economic sphere. In the former it means that final preparations for war must be made, and if necessary a preventive war embarked upon. The same course must be taken in the economic sphere. Action must be prompt and of such a nature that, if possible, the prospective enemy notices nothing.

Home supplies must be supplemented and secured for a long time to come. Our ships in foreign waters must be recalled and the necessary instructions issued to the agricultural

interests. It will thus be seen that the preliminary work must begin early if the preparations for war are not to be noticed by the enemy, and that it is impossible to do what is necessary publicly. If we took that course we should always be too late. Thus we must not be afraid of making secret preparations for war or of beginning it ourselves. The real responsibility will be exclusively at the door of those who have made the preservation of peace impossible. We must not let ourselves be drawn into wrong paths by superficial ideals which will receive the applause of the masses. It is the greatest cruelty towards one's own people to lack the courage to begin a necessary war, to abandon vital interests in order to keep the peace, and to sacrifice the welfare of the whole state to attain an ideal which is unattainable.

He who directs national policy (policy in its widest signification), and is thus responsible for the welfare and prosperity of the whole state in its ever changing relations with the other great powers, must know how to keep the initiative in every sense in his own strong hand. That is the first and vital law in both the political and economic spheres. But there is another factor which must receive his attention, the factor of military power. If policy

depends wholly on this last factor, it will be essential to develop it to the highest possible standard and thus extend the prospects open to statesmanship. If the statesman is always to keep the initiative he must realize that his chances are proportionate to the military power behind him. Thus the principal task of statesmanship is to further the development of the national forces. Our enemies fully realize this.

CHAPTER VII

THE GENERAL DISTRIBUTION OF THE TROOPS

In discussing the influence of politics and economics in the origin and cause of wars we complete the whole series of factors which may influence military operations and the tactical problems confronting the troops. We have now to inquire and consider how the armies are to be distributed over the theater or theaters of war in order that the best possible use may be made of them.

In the first place, the general plan of campaign is the determining factor. The troops must be so distributed that there is a center of gravity at some point. It is the business of the commander in chief to select this point. It must be chosen in such a way that, if the calculations of time and space are accurate, successful operations are bound to develop. Thus, at the beginning of the World War the Germans cleverly left only four army corps on the Russian frontier, apart from local troops, because we relied on the slowness of the Russian

mobilization. It was German diplomacy alone (which once more misled the Supreme Command) which made this calculation erroneous. We then failed to find the courage to act on purely military considerations and abandon East Prussia to the enemy for a time. Instead, we transferred a number of army corps from the western to the eastern theater, and thus lost our chance of a decision in order to save a province.

I have referred to this case before, if I am not mistaken, and laid stress on the fact that I was in no way criticizing the Supreme Command, because I am not sufficiently acquainted with all the circumstances. Yet this case is significant because it teaches us how difficult it is to pursue one idea to its logical conclusion, to avoid being distracted from it by a temporary setback and yet to abandon it at the right moment. It is particularly difficult for a king to decide to abandon a fertile province to the enemy. That aspect of the matter must, of course, be considered, but what is required of a real commander is a certain courage to take responsibility and a refusal to allow himself to be influenced by such sentimental objections. In Germany at that time there was no such figure at the head of our military machine, and

he who was responsible for our strategy was a sick man.

As war can be conducted only offensively, and the offensive thus determines all strategy, the latter must be given special weight in considering the distribution of the troops. But the requirements of the defensive also must be borne in mind, and, if possible, in such a way that the measures they involve are the same as those which can serve for the offensive if required. Yet, where there is any conflict between them, offensive dispositions must be preferred. This statement is a fundamental rule applying to both trench and open warfare.

The division, as the unit which should never be broken up if it can be helped, has proved itself the real basic unit in war. In open warfare it looks as if that unit were the corps. Its composition usually remains unchanged while an action is in progress. The division only is moved from one part of a theater of war to another, or from one theater to another, while the army corps remains in one place. Thus the corps is perpetually changing its divisions. The result is that the influence of the corps commander on the men is purely illusory, while the divisional commander is the really responsible figure. This has proved quite a practical

system. It is particularly conspicuous in trench warfare, less so in open warfare, as I have said before. Thus, in trench warfare we see the divisions perpetually in movement, while in the second case the situation is more permanent. This is due to special circumstances. In trench warfare the really effective divisions have continually to be sent to that part of the battle-line which is most seriously threatened by the enemy, while troops which have done their share are sent to the quietest sectors or brought back into rest billets. In open warfare the distribution is generally permanent until it develops into trench warfare again for one reason or another.

The next higher unit is the army, which usually consists of three to six corps. Several armies form the army group.

As regards open warfare itself, from a strategic point of view at any rate, much the same laws apply as in the case of earlier wars, for a rigid defense, such as that of Frederick the Great at Bunzelwitz (which was extremely similar to modern trench warfare), is all the more unlikely because such operations were inspired by the peculiarities of the enemy and the characteristics of war at that time. It will be far more a matter of advancing or retreat-

ing until the successful blow has been delivered at a decisive point, when the other army groups will have to advance or retire in conformity. As a rule, it will only be when the theaters of war are at a great distance from each other that one of them will have no influence on the other. But where a decision is reached either in the sole theater or (where there are two or more) in an adjacent theater, it will usually have its effect on the other fronts.

The distribution of the troops will be determined on these principles. We shall always direct the bulk of our divisions to the point at which we think a victory would strike the enemy's vitals, and these divisions will be sent to the selected points during the approach in order that the object of the whole operation may not be betrayed by their lateral movements by railway or road. It will also be essential to effect the approach as rapidly as possible in order that the time available to the enemy to take his counter-measures may be very short. The cavalry will be disposed on the wings to hinder hostile reconnaissance or assist our own. Marching will be only by night, to prevent observation by enemy aircraft, and this will also be dealt with in the air itself.

Here, again, the functions of the artillery

will assume greater importance than ever before. We shall endeavor to appear on the battlefield with the largest possible force of artillery from the point of view of both numbers and caliber. This artillery will be taken from the army reserve of the army in question, and it is plain that every army must have such a reserve, which will consist primarily of heavy guns. The infantry action will be essentially a machine-gun action, and the cavalry will play a relatively unimportant rôle. After the action, on the other hand, its functions will be much more important, as it will have to perform the duty of pursuing the enemy laterally or defending us against such a pursuit. In the ensuing operations everything will depend upon the speed of the horse. These considerations will be borne in mind in distributing the troops, and the independent cavalry force will be sent to the point where maneuver warfare is in progress or to be anticipated. In action itself it will have to rely entirely on its firearms.

As regards trench warfare, we shall first distribute as many divisions on the line appointed for defense as we consider absolutely necessary to beat off the first hostile attacks. What other special arrangements are made will depend

upon a great variety of circumstances. The configuration of the ground, the intentions of the enemy and his distance from us will be most material. If the ground is particularly suitable for defense and the enemy far away, we shall, of course, need fewer troops than otherwise. On the other hand, more men will be required when the enemy is very near or there is a possibility that he will attack. The amount of artillery at his disposal will also be important in this connection.

A variety of methods may be employed for the defense itself. The front line may be selected as the main line of defense and small listening-posts established only a short distance in front of the wire entanglements, which will be pretty close to our own lines. This was a very common phenomenon in Russia during the World War. On the other hand, we may hold the main line of defense only lightly, send out outposts perhaps a kilometer ahead and dispose our main force in several waves in such a way that they can recover the main line of defense by a counter-attack. In this case, the attack by the reserves is the main feature. Of course there are variations innumerable, which need not all be discussed here between these two extremes.

In the reserve line, and as far away from the enemy as possible, will be the casualty clearing stations, the function of which is to receive cases of slight wounds and such men as require immediate operation. Like all other hospitals, they work under the protection of the Geneva Cross. This matter requires special consideration. The divisions have to be moved about from time to time to give the men the necessary rest. The question arises whether these casualty clearing stations should be taken with the divisions, or should remain permanently in one place. In the first case, they are on the move a large part of the time, and thus the medical work is hindered. In the second, medical activity is not interrupted, and they always get the same cases—which has its advantages—but, on the other hand, they do not serve the divisions, and these are always getting fresh doctors, which does not promote confidential relations between the senior medical officer and the divisional commander. The best system will be to give part of the clearing station a definite station, and move the other part with the division.

These arrangements do not complete the whole distribution of the troops in trench warfare. Other divisions will be assembled be-

hind the troops which are required for direct defense, and these divisions must be prepared to deal with any enemy attacks on a considerable scale, or carry through our own. Here, again, much will depend upon the configuration of the ground and the behavior of the enemy, and in addition our own measures for the defense will be determined by our decision to hold the main line of defense throughout, or only to recover it by a counter-attack. It will frequently happen, especially if the enemy hold his line in considerable strength, that we shall have to crowd our divisions more closely than under ordinary circumstances and concentrate considerable reserves in support. The latter will be brought up so close to the enemy that they can intervene promptly, and thus take him by surprise. The best course is to assemble them at a railway junction, from which they can be rapidly transferred to the point where we intend to use them.

As a general rule, cavalry will not be employed for this purpose. Their ordinary and, indeed, sole function in trench warfare is police duty. We shall bring them into action—and then as infantry, of course—only in exceptional cases where no other troops are available. It will be primarily artillery and infantry which

we shall concentrate at such points. These reserves will usually consist of troops which are behind the line in rest billets, or have been brought up specially for this purpose. The movements of artillery and ammunition columns must be planned with the greatest care, as these betray our intentions to the enemy more easily than anything else. Signal troops and aircraft will also be in the rear at our disposal, because we shall want to economize them as long as possible, and aircraft, at any rate, can operate from a long way back. Another reason is that we shall want to use them at once when the enemy begins to show signs that the moment has come. Of course some of our aircraft must always be in contact with the enemy in order that we may be informed of the latter's intentions as soon as possible.

The upshot of all this is that in trench warfare it is necessary to have railway lines behind and parallel with our front, as well as branch lines connecting the latter with the former. In open warfare, on the other hand, we must have lines leading as directly as possible from the home country to the front, and lateral railway communications will be required only to a limited extent. Of course suitable railway communications are not always available, and

in this case we shall have to extend such as there are, and make the most of them. We shall construct the most essential lines first, i. e., the lateral in trench warfare and the main system in open warfare. They must then be developed according to requirements. Apart from the offshoots to the front, the lateral lines, which are particularly necessary in trench warfare, will send out main lines to the home country. There must be at least one such main line for every army, and possibly two. It will all depend on the size of the army, which is in turn dependent upon the nature of the country and our own offensive intentions. The offshoots to the front will generally be small field railways, on which we can use special locomotives or horse traction in an emergency. All kinds of stores and material which an army needs for the maintenance of its striking power —veterinary hospitals, remount depots, repair workshops, food depots in series one behind the other, field dressing stations, casualty clearing stations and clearing hospitals, recruit depots, arsenals, medical stores, and so on—will be distributed on these lines and the main railways, as well as in adjacent villages. The longer an army remains in one place the more establishments of this kind will it accumulate, and these

can become a positive danger when it advances, and particularly if it retreats. We shall thus do our best to avoid keeping supplies close to the line, and we must arrange things in such a way that only what is essential is brought up as it is required. The main depots will be established very far back, if possible in the home country. Of course, the greatest attention must be devoted to the railway arrangements, for if there is any failure in this department universal confusion is produced, and the troops are the first to suffer. It is extremely important to come to a right decision as to what can be stored permanently in depots and what must be sent out to the troops. The longer we think we can hold a certain position the more we can venture to establish depots close up to the line. In this matter the whole railway system at our disposal is the determining factor. The larger the number of railways leading straight to the front line the larger the quantity of supplies we can accumulate behind it, but we must be careful to secure that, in case of emergency—e. g., where a sudden retreat becomes necessary—we have the requisite rolling stock to get them away. In deciding this question of depots, there will often be a conflict between our desire to give the army what it wants and the

necessity of keeping it as mobile as possible. Another important aspect of this matter will be our anxiety for our rolling stock. In view of the enormous number of troops which have to be moved hither and thither, the colossal demand of the home country, and the output of industrial establishments (which is increased by the manufacture of war material), it is practically impossible to keep the permanent way and rolling stock in a proper condition. It naturally deteriorates in time, and in many cases it will be impossible to effect the necessary repairs, especially when the war has lasted a considerable time. This question of material is of great importance, and involves that perfect system of supervision which is possible only with a really first-rate railway staff. Unfortunately, in a modern war in which every man fit to fight is called to the colors, such a staff is not always available.

Thus, in modern times military operations are dependent upon the available railway system. If the defense is tied to railways, the attack is even more so. It depends not only upon the existence of railways, but also upon their condition, because rapidity of movement is everything. In distributing the troops we must pay the greatest attention to the railway

system, and, above all, consider the enemy's, as otherwise it may happen that the enemy who has realized our intentions may be able to bring up more troops than we ourselves.

But, when all is said, the proper distribution of the troops is an exceedingly difficult problem, especially in the defense, for the defender is generally compelled to follow his opponent's lead, and often has the worse rail and road communications, the reason being that if there is any element of surprise in the enemy's attack he generally has no time to develop it adequately.

To sum up everything I have said, we shall always have to distinguish between open and trench warfare, although they often shade off into each other.

In trench warfare our first business will be to man our lines with the number of divisions we think necessary to hold the front involved. We shall dispose the rest of our troops, and particularly our infantry, artillery and reconnoitering force, at suitable railway and road junctions, in order that we can use them if required as reserves, or have them available for our own counter-attack. Everything else, including material required by the army, we shall have behind, close to the railways leading back

to the home country so that they will be handy for sending up to the armies or can be easily moved if required.

In open warfare, on the other hand, our reserves will also be distributed among the armies, but the distribution will take place at the very outset, i. e., before the operations start. As we know for certain where we intend to send our main force, our reserves can be directed from home straight to the point at which they will be needed to help in securing a decision. The cavalry will, in any case, be posted on the wings of the armies and, indeed, well ahead. In trench warfare, on the other hand, it will be disposed behind the main wing of the attack, and then only when a decisive break-through is planned, so that the transition to open warfare is imminent, a matter which we shall discuss in the next chapter. The mass of the cavalry will be concentrated at the point which is to be the center of gravity of the whole attack. As regards the lines of communication, the only difference will be that, in one case, they are tied to one place, while in the other they go forward by stages. The armies have to be supplied in either case, and the depots must therefore be continuously pushed forward in open warfare, until at length they

become a fixture again, so to speak, when trench warfare is resumed. It is obvious that in both cases they must be in close touch with the railways. The railway net will have to be extended correspondingly if we think we are likely to remain permanently in contact with the enemy. It will be under the control of the Lines-of-Communication Inspectorate and be comprised in its area.

I discussed the question of supply in open warfare at great length in my book *Vom heutigen Kriege.*[1]

[1] *Vom heutigen Kriege,* Vols. I, II, Chap. vi.

CHAPTER VIII

THE BATTLE

It is a great mistake, though unfortunately made only too often, to regard the last war as being the one and only war, and, therefore, to imagine that the next one must be always on the model of the past. In the case of the World War this is a double mistake, for it is certain that we have just opened a new world period, and this for two reasons. In the first place, the last war obviously represents the beginning of a new evolution; it is a war of development, not the last chapter of a historical period which has ended. We must therefore assume that many of its phenomena will undergo very material changes before they attain a certain degree of permanence, and that the war of the future will take forms different from any which we have known from past experience. In the second place, it must be remembered that the last war was fought under conditions which probably will never recur.

Germany and Austria stood alone against a

world in arms. Thanks to our mistakes of policy, all the states whose power made them serious opponents combined against us, and even savage races found themselves in the enemy's ranks. We defeated them all, until at length we succumbed to our own nation, and the revolution put an end to the war. We were cut off from all maritime communications, surrounded by enemies on all sides, and our allies bore the germ of defeat within them. The result of all this was that the war was not concluded in a military sense but brought to an end by political occurrences. These circumstances are not in the least likely to recur. We shall have a different alliance policy, and therefore occupy a different position in the world. This is not the place to discuss the political prospects which are opening for us as the result of the present situation. But our international position will no doubt undergo a change. We must find allies on whom we can rely, and, above all, make ourselves so strong that we can hold our own and win the confidence of our neighbors. In future it is highly improbable that we shall see another combination of all the powers against us and the utter collapse of our weak allies. If there is another war—and wars will never be altogether

avoided, in spite of all socialistic theories—it will be under different circumstances from those of the World War. We can think of innumerable cases in which a war would be fought under quite different conditions from those in which Germany fought the world. In the present world situation it is easy to imagine war in the most varied conditions, but none of them can even remotely resemble the conditions of the past.

It must further be remembered that, as we saw, every future war will have to be offensive if the parties desire to protect their own soil. The result is that the present strategic methods of our enemies already seem utterly out of date. In addition there is the fact that fortresses no longer hold out any prospects for the defense. It is true that in the last war fortress operations took place on more than one occasion—I need only refer to the siege of Antwerp—but, generally speaking, the uselessness of fortresses is universally recognized, and, in future, no one will be able to rely on holding them. Thus there is no reason to devote a special chapter to fortress operations. The lessons which could be drawn from the different sieges are out of date, because the siege of a fortress is not likely to be witnessed again.

In the case of the battle for a fortified sector, which has taken the place of the old siege, the same principles apply which determine the form of operations for local advantages in trench warfare. I must therefore refer the reader to the special chapter on this subject, with the sole distinction, which is, of course, important, that on the one side the defense works will be permanent and therefore relatively strong, while, on the other, the artillery which is to deal with them must comprise correspondingly large calibers. We shall have to bring up the heaviest guns on which we can lay hands, while our opponents, for their part, will construct the shelters for the garrison in such a way that it can endure even the heaviest fire and still remain effective. Which side will prove the victor in this duel is as obvious as the fact that hitherto artillery has proved itself superior to fortifications, and will certainly remain so in the future. On the other hand, the defender will gain time in all cases, and that is a particularly important matter in the defense. But if a decision is gained, the former defender will have to launch a corresponding offensive himself.

Another characteristic of modern war is that the issue is decided by the artillery, and that

the only function of the infantry is to reap the fruits of the artillery victory. It thus remains the queen of arms, because war is inconceivable without it, and its advance gives the measure of the success attained. A decisive victory is impossible without infantry, but this does not alter the fact that a victory can be secured only if we possess an artillery superiority.

All these circumstances are peculiar to modern war, as we have seen it, but without careful examination no one can assume that they will have the same importance in future. It is therefore necessary to study modern war very closely in order to ascertain which of its characteristic elements seem permanent and which temporary. It is also necessary to decide in what direction we are bound to expect changes, and how developments will end.

The last topic must form the subject of a future book, but, so far as the recent war is concerned, my task in the present work is to discuss its characteristic phenomena—as far as is possible in the present state of knowledge—in such a way as to give a general picture of modern military operations, and also enable every one to come to some conclusion as to what may be expected in the future.

The distribution of the troops in war (as it is to-day, and in this particular matter has ever been) is generally dependent upon the plan of campaign. In the last war this plan was determined by events which I have already described. It was a war which began as a war on two fronts—France and Russia—and gradually developed into a world war as the result of the participation of England, Italy, Rumania, and finally America—mainly as the result of our mistakes, I am sorry to say. In such circumstances it was impossible to adhere to a set strategic program. Our original idea of the war was a two-front war in which we intended to stand on the defensive at first in Russia until a decision was reached in France. This situation gradually changed. As the result of the transfer of troops from west to east, the Battle of the Marne, and the help which we had to send to the Austrians, we were compelled to stand on the defensive in France and take the offensive in Russia, Rumania, and Italy. We won brilliant victories and then passed to the defensive in those theaters while we made our final attempt to secure a decision in France—a goal we unfortunately did not reach—before the Americans appeared in masses on the western theater and the revolu-

tion broke out in Germany. The result was that the last war was essentially a trench war. I have already said elsewhere everything that needs to be said about its tactical aspects.

In the west it was the Battle of the Marne which made this development inevitable. In the east it arose gradually out of the numerical superiority of the Russians, which finally dominated the whole war. In trench warfare, which will interest us first, we must assume that the two sides are equal and that the equality—at any rate, the element of *morale*—is such as can change only gradually. Open warfare, on the other hand, ensues where no continuous lines have yet been formed, or when one of the two sides has succeeded in breaking his opponent's line, and thus in reëstablishing the conditions of maneuver warfare.

As long as trench warfare is in progress, the form of operations will be not so much an action for a decision as a general forward or backward movement of the opposing lines. Of course, such movement may involve great distances. It may represent a great gain to one side and a great loss to the other, but a decision can never be reached merely by this process. Open warfare alone can bring the decision. When the attacker is exhausted and

has to give up the idea of enveloping his opponent, while the defender succeeds in preserving the continuity of his line by bringing up troops from both sides, there will, of course, be a loss of ground and large captures of guns, machine-guns and prisoners; but it will be impossible to speak of a real decision.

This is what happened to us in all our great victories in France. It happened in our great offensive in the spring of 1918, in the fighting on the Lys—the so-called Battle of Armentières—and the capture of Mount Kemmel. There can be no doubt that our troops performed almost superhuman feats, but it was impossible to speak of a real annihilation of the hostile armies because they succeeded in reestablishing their lines locally and tactically. From the Battle of the Marne onwards we fought the whole war in France without ever obtaining a decision, although we won brilliant victories at different points and exhausted the enemy almost to the point of extinction. We must not deceive ourselves on this point in considering the war as a whole. In all our battles we never succeeded in breaking through the enemy, and as far as we can see it would have been very difficult for us to do so after the Americans had appeared in the western

theater and increased the numbers at the disposal of our enemies very considerably. By that time a complete victory was certainly out of the question, but it would still have been possible to bring the war to an honorable conclusion.

It was otherwise in the Russo-Rumanian theater. There we succeeded time after time—quite apart from the battles at the beginning of the war, of course—in breaking through the hostile lines and obtaining a decision which led to the Peace of Brest-Litovsk after the Revolution had prepared the way.

People may say what they like about that. My business is simply to emphasize that a decision is possible only in open warfare, and that everything turns on transforming trench warfare, which may have been necessitated by circumstances, into open warfare in which the enemy can be enveloped, at any rate, on one flank, and his communications threatened. Such operations alone are capable of forcing a decision, for in no other way is it possible to throw the hostile armies into really disastrous confusion. In war that is the only goal.

We must start by considering trench warfare with limited objectives, because it represents the larger part of modern operations. Next,

we must discuss trench warfare which is intended to lead to a decision. Last, we must deal with open warfare, because such operations and the decision they bring are the final goal of war.

In doing so, we must always remember that we are thinking only of war in its *present* stage of development, not of the war with which the future may possibly present us.

I.—The Struggle for Local Advantages in Trench Warfare

In considering the subject of actions for local advantages in trench warfare (and I take it first because such actions are peculiarly characteristic of modern war), we must realize at the outset that they involve a gain of ground and their purpose is to inflict on the enemy the greatest possible damage or rob him of some particularly important area. In either case, the attack will have to be purely frontal. It will therefore be necessary to concentrate so superior a force for the attack that the defender is rendered helpless before the real infantry assault begins, and the latter must be accompanied by a barrage which is bound to break the last attempts at resistance of the enemy's infantry if it is still capable of the effort.

As I have already said, the most difficult part of this program is the artillery concentration. It must be effected without the enemy's noticing anything. It must be on such a scale that the artillery can reduce the enemy to helplessness in the shortest possible time; the hostile infantry must be made incapable of bringing the attack to a standstill. The barrage must settle the defending infantry once and for all. We must also arrange that the batteries can at once follow the storming infantry, so that the hostile artillery has no chance of deploying afresh out of our range and, supported from the wings and rear if possible, to neutralize the effect of our guns. We shall also have to take suitable precautions against hostile aircraft. Thus the movements which so tedious an operation as concentration requires, and our preparations to cross the so-called "No Man's Land," will have to be carried out by night only. The arrangements required for crossing No Man's Land will be particularly numerous and complicated. Bridging-material must be prepared, roads must be constructed and improved, and labor units must be at hand with all the paraphernalia they require. In short, a huge and complicated operation is needed if

the attack is to have the element of surprise and to be a real success.

As regards the defensive system itself, quite apart from the effects of shell-fire this will frequently be made almost impassable to the attacker by trenches and wire entanglements. In addition, the enormous amount of ammunition which the attacker requires has to be brought up to the front lines and then sent forward as the advance proceeds. As regards food, however, we shall be able to rely to a certain extent on the supplies we shall find in the enemy's lines. To trust to these alone is very unwise, for we can never tell exactly what we shall find. A certain amount of food must therefore be sent up to the advancing infantry in order to be on the safe side. For the rest, it is advisable to select an area for our deployment which is as safe as possible from hostile observation and enables us to conceal our batteries and ammunition dumps. It will thus be realized how difficult such a deployment is, and what a number of aspects have to be considered. The best course, to all appearances, is to deploy the artillery in two waves, as I said elsewhere. The first must be strong enough to fulfill all the duties which the attack imposes, while the second (provided with the

necessary ammunition) must be ready to accompany the storm troops immediately they go forward. Such a disposition will mean that the enemy's guns (a sufficient number of them, at least) will never have time to adopt defensive dispositions, and the attack will roll forward uninterruptedly. The artillery which is subsequently to accompany the infantry with its barrage will first participate in the neutralization of the hostile artillery, and only start its barrage work when the enemy's artillery can be regarded as silenced and our own infantry leaves its trenches.

Turning to the infantry attack, it will be best to adopt dispositions similar to those we have considered for the artillery. We shall not content ourselves with sending our infantry forward in a single wave which is just strong enough to perform its task. We prefer to arrange for several waves composed of the same arms, so that when the force of the first is spent the second (or the third, as the case may be) is immediately available to continue the attack. Quite apart from the ordinary artillery dispositions, we shall have our infantry accompanied by assault batteries, which—as I have said before—have the duty of supporting their ad-

vance directly, though not in the same way as the barrage.

The attack will thus go forward until it reaches its objective. The infantry must then be strong enough to deal with the enemy's counter-attack and hold their ground against further attacks, which may become very violent after a time. It must be considered a very serious mistake to assign too few troops to a projected attack or expect more of them than they can possibly achieve. Again, the attack must never be broken off before we have reached ground which is suitable for defense. If this rule be neglected we shall find that when the force of the attack has spent itself we are in an extremely awkward position. For instance, if we leave the enemy in dominating positions in front of our new line, or if we have no observation over his new front, when once the attack is over it will be very difficult to escape the enemy's observation or find out his intentions. Thus, *before* we plan our attack we must find out how many troops the enemy has in the sector itself and how many more he can bring up after the moment at which he realizes that the attack is coming.

The enemy will find himself perfectly helpless if the attack comes as a complete surprise

to him and is really well prepared. All he can do is to bring up reënforcements from the flanks or the rear, and these will not be adequate to hold up our progress if our arrangements have been good. It is much more likely that we shall reach our objective.

The course of events will be very different if the enemy has noticed our preparations for the attack and is ready for it. In that case he also can bring up infantry and artillery in time and confront the attackers with troops some of which are, at any rate, of equal value. The probability is that an indecisive action will be the result if the attack is pressed through. The position will be far more favorable for a defender if, in the particular case, he decides not to hold his front line, and from the outset confines himself to maintaining another line farther back. Of course his enemy must know nothing of this intention. The defender will, therefore, keep at any rate part of the garrison in the front line, and if necessary sacrifice it. He will take the same course with part of his artillery, which naturally cannot abandon its positions altogether without betraying the secret. But the defender derives enormous advantage in other ways. All his artillery reenforcements, duly provided with ammunition,

can be concentrated beyond the range of the attacker's artillery. The same course may be taken with the infantry whose function it is to defend the line which is intended to be seriously held. The hostile barrage will affect only a small part of the defending infantry, *and the defender knows this beforehand.* There will be no need to send up ammunition and food as is required when the front line is reënforced. In short, the defender is in a much better position than the attacker, as to a certain extent he can settle beforehand what sacrifices he is prepared to make.

Of course, the attacker's artillery will partially annihilate the infantry force which the defender has left in his front line for the purposes of demonstration. It will also be able to silence such of the hostile artillery as has not been withdrawn. The artillery reënforcements will not be harmed, nor that portion of the infantry to which is assigned the duty of holding the selected main line of defense. On the other hand, the attacker's infantry, which has captured the first line of defense with obvious ease and probably quickly overrun the defender's first artillery positions, now comes within range of destruction fire from the enemy's artillery reënforcements and the main infantry

force, both of which have suffered no injury at all, as they were disposed beyond the range of the attacker's guns. It may be assumed that in these circumstances the attacker will suffer the heaviest losses and fail to achieve his purposes altogether. He will be able to avoid absolute ruin only by realizing his mistake in time and refraining from the fatal onslaught on the enemy's main line of defense. He will certainly have captured his adversary's front lines, but the losses he will have suffered will be losses out of all proportion to this limited gain. The defender, on the other hand, will only have lost ground which need never be of great value. The losses he has suffered, on the other hand, will be practically nothing in comparison with those of the attacker. If this process is repeated fairly frequently, in the long run the losses of the attacker will be so great that he will not dare to venture on a *decisive* battle, and ultimately will find that he has lost the war.

Such a development of events must be avoided at all cost, but as it is extraordinarily difficult, in spite of all precautions, advantages of ground and demonstrations at various points, to conceal the preparations for the attack, especially when the enemy has got wind

of it and knows how to recognize the signs (he will frequently find out that an attack is imminent by examining deserters and prisoners), I can see only one way in which he can reach his goal, and that is by combining retirement and the attack. The fundamental idea behind this suggestion is that the complicated machinery of attack should be got ready behind a line in the rear which is to be the starting-point for the attack itself, so that this line would be quite out of the range of hostile reconnaissance and observation, not to mention artillery fire. When this line had been prepared for the attack in every detail the attacker would withdraw his front to it and open his attack by surprise after the enemy had come forward into the open.

It is essential for the success of such a plan that the retirement seem perfectly genuine to the enemy, and for that reason it should involve a shortening of the front or the abandonment of a position which is strategically and tactically unfavorable. As it will also be very difficult to prevent the enemy from finding out through deserters or prisoners that an attack is imminent, we must arrange matters in such a way that our own troops themselves know nothing about it.

It will thus be seen that the vital point is to prevent the enemy from knowing anything about the attack, so that it will come as a surprise and find him, if possible, unprepared.

We shall attain this end if we select the point on our available front for our proposed attack in such a way that, as I have said, our withdrawal seems natural, and involves the loss of an area which must not be too small (without leaving the enemy positions which are easy to defend). We must also be entitled to hope that the ensuing attack will cause the enemy great losses, fatal losses if possible, and also reach objectives of strategic importance.

We shall now construct the real line which is to be the starting-point of our attack behind our original line, which can be abandoned to the enemy for a time without any serious disadvantage. If at all possible, it must leave the enemy an unfavorable forward zone, while our own (and the developments which are in progress behind it) are safe from hostile observation owing to the lie of the ground.

The trenches will be constructed as well as the necessary cover. Battery ranges will be established and artillery maps drawn up. An adequate amount of ammunition will be brought up. The divisions earmarked for the

subsequent attack will be disposed at the proper distance behind. The road system will be developed. Then the artillery will gradually be concentrated. In short, all arrangements will be made for the attack as inconspicuously as possible. We shall also pretend that we are ourselves expecting a great enemy attack, and intend to retire to our rear line of defense either when it begins or when we know it is imminent. As an example, I might refer to Hindenburg's retirement to the Siegfried Line.

As no sort of preparation for an attack would be made behind the advanced position it would be only natural for our own troops to assume that we have no idea of such an attack, and probably they will say as much. The enemy, too, will observe no preparations for attack, but will probably discover that a position in rear is being constructed, and assume from this fact that an intention to attack is out of the question. We may strengthen the illusion by making preparations for a great attack, at least superficially, behind our front line at some other point and taking steps which seem to point to such an intention, e. g., constructing field railways, moving columns at

night, bringing up batteries, establishing sham ammunition dumps and so on.

While our preparations for the real attack from the rear position are in progress, and before we abandon our forward position, we must make certain arrangements in the latter which will be useful to us during our subsequent attack, but the object of which will be unknown to the enemy. I refer to the selection of emplacements for the batteries which we shall rush up to these points when our attack has passed our original front line, so that we can be certain of having artillery support for the next stage of the advance. The artillery maps must be ready and the survey posts measured and indicated so that it will be possible for our guns to get on again with sufficient rapidity. If circumstances make it desirable similar artillery emplacements should be established between the front and rear positions so that the batteries can be sent forward by stages.

As I have already said, it is very desirable that a second artillery wave should be disposed behind the batteries we have earmarked for the first attack, so that we can "lift" our artillery fire without having to diminish the volume of our artillery fire from the first wave—at any rate, while the latter is going forward.

It is also desirable not to make too heavy demands on the attacking infantry. After a war has lasted some time, the infantry will not be so efficient as when it began. Battle methods require that all the subordinate commanders have a high degree of independence and self-reliance. As a matter of fact, the shortage of officers and N.C.O.'s means that these qualities are to be found only to a limited extent, especially when we remember that, generally speaking, little time can be spent on training men to act on their own initiative. Moreover, in war we have always to reckon with unforeseen circumstances and occurrences —the unexpected appearance of hostile reserves and so on—and we must not forget the disintegrating and, to a certain extent, demoralizing effects of modern battle on troops which are not a perfect instrument of war.

It is thus advisable to assemble as many infantry waves for the attack as our numbers permit and circumstances require. The larger the number, the greater will be our prospects of reaching the strategic objective which we have set before us, instead of sticking halfway because our infantry fails us. It would be better to limit the number and scale of our at-

tacks than to impose restrictions upon ourselves in this respect.

As soon as we have made all these arrangements in the way I have described, arrangements which will doubtless be regarded by our own troops as preparations for retreat, we shall begin our real withdrawal to the prepared position in the rear, taking care to destroy all shell-proof dug-outs, and carrying out the movement by stages, so that the enemy will follow us up slowly and have time to bring his artillery with him.

We must do everything in our power to compel the enemy to follow us up. High ground, villages and areas he had previously lost must be offered as a bait to his military pride. Casual announcements of our intention to withdraw must challenge him, and local counter-attacks must keep him in check the whole time the withdrawal is in progress. Before the retreat starts the hostile artillery must be freely gassed (with the "yellow cross" gas-shell) in order to compel it to leave its emplacements. This gassing will not only assist our own withdrawal, but its after-effects will make themselves felt in our subsequent attack, for it will first make the enemy leave his position as quickly as possible, and then prevent him from

concentrating in the same area. Yet it is practically immaterial whether the enemy follows us very quickly or not. Indeed, it is better to give him a few days in which to get up all his forces, particularly his artillery, to the selected spot.

It is not easy to determine the right moment for our attack, for if we are to make full use of our advantages of position, it is essential that we surprise the enemy at the moment in which his defensive arrangements—particularly his artillery and signal system—which have been disorganized by the general change of position, have not yet settled down again. Too much delay will mean letting him get too strong and involves a risk to the masses of material and ammunition we have assembled. On the other hand, a premature thrust into the void is far more dangerous. It is for this reason that, beginning with the first day of the retreat, our whole observation system—surveying, balloons, aircraft, ground observation—will be directed unceasingly to discovering the movements of the enemy, and especially the arrival of his artillery. Familiarity with the area to be occupied by the enemy—which can be obtained by reconnoitering and examining the lines before the retreat—will prove

very useful to all concerned later on. The results of reconnaissance during these few days will be the foundation of our artillery work.

When we have thus arrived in our "departure" position, we shall only allow ourselves long enough to ascertain by aircraft and other observation that at any rate the bulk of the enemy's artillery has arrived. Then, in the last night, the attacking infantry and escort batteries will take up their position in the lines and immediately launch the attack. By so doing we shall reap the following advantages:

The concentration of the artillery and the deployment of the attack divisions will be concealed from the enemy. The delicate work of reconnoitering and surveying the battery positions, fixing the aiming points, and so forth, will be done much more carefully out of the enemy's range. For the same reason the heavy business of concentrating our batteries and bringing up ammunition, which will be favored by the good roads of the back area, will proceed more smoothly and safely, and without involving wastage in men, horses, equipment and ammunition. This advantage will also enable us systematically to distribute the concentration of the necessary material over the whole period at our disposal before the day fixed for

the attack. This and the strict control of traffic, which must be supervised by officers right up to the front line, will prevent that unusually heavy traffic in the back area which only too often betrays one's intentions. A few reports of particular activity will, as a rule, be construed by the enemy as the construction of a position in rear, and, as I have said, this pretense will help to conceal our purpose even from our own troops.

All the preparations, down to the last details, will be under the personal supervision of senior officers.

In this way we shall take the enemy entirely by surprise, and find him in unprepared lines. We need not expect to meet strong enemy reserves at the start, and if they are brought up subsequently their intervention can hardly be systematic. A deep zone pitted with shell-holes is a formidable obstacle. In the area just evacuated we shall find a good network of roads and light railways. The enemy himself will have made great efforts to restore what we had to destroy. The possibility of bringing up heavy artillery to the front line will secure our artillery preparation the necessary depth, so that we can silence even the distant hostile artillery and deal with occupied positions in

the rear. These preparations may to some degree be extended to what will be enemy territory also. Battery emplacements can be fixed, and officers and men familiarized with the ground beforehand. The artillery can reconnoiter targets, and ascertain suitable points for observation and emplacements. The signal service will be able to work on the preparations for quickly establishing a signal system in the enemy's territory. The lines of approach can be repaired and road-mending material can be accumulated at inconspicuous points in the heart of the enemy's ground. It is even possible to accumulate small ammunition dumps for the infantry gun batteries in secret places. Lastly, the employment of gas batteries on a great scale as a weapon of attack is quite possible, thanks to the favorable conditions for the concentration.

A salvo of about a thousand trench-mortar gas-shells to every kilometer of front will have an enormous effect, and in favorable circumstances throw the enemy into confusion even a long way behind his front line. The work of emplacing these mortars must be started long beforehand and carefully concealed from aërial observation. The ammunition itself must not

be brought up to the line before the night of the attack.

In these circumstances, the concentration of all our resources for the attack and the fact that the enemy, who will not have had time to dig himself in, is without cover, enable us to curtail our artillery preparations very appreciably and thus secure a great advantage over the enemy's approaching reserves. As I have said before, this artillery preparation itself will be extremely violent and may therefore be short. The excellent conditions in which the concentration has been carried out will permit an expenditure of material and ammunition on a scale surpassing all previous experience. In these conditions a complete success is extremely probable, but it will be far from easy to repeat such an operation with equal success a second time. It is therefore advisable to use this system of attack *once only* for a vital offensive, and thus secure the decision of the whole campaign.

In what I have been saying I have involuntarily adopted the German point of view, and for the rest described the forms of action which practically made up the war and with which I myself have been familiar. Yet it must not be forgotten that the offensive has other

methods in addition to those I have described, while, generally speaking, the defense cannot take a form very different from that I have outlined in my pages. I cannot, of course, discuss these other methods on the same lines, because I have had no personal experience of them, and such discussions must be based on personal experience. Moreover, I should only repeat myself on very many points if I went into them in any greater detail. After all, the weapons available are always the same—artillery, tanks and infantry—though the methods of coöperation may vary. It all comes back to the same thing.

In every case surprise will be the vital factor. Tanks can be concentrated much more rapidly than infantry if an adequate road system is available. We can therefore produce the effect of surprise much more easily with tanks than with infantry. Our enemies seem to have succeeded by this method on several occasions. But as regards artillery, success depends to an enormous degree on the number of guns at our disposal. In the last war four European armies were united against us, and they were joined by the American in the last year, while on our side Turkey and Bulgaria only counted in so far as we ourselves had to supply them with

guns and ammunition. The industries of the whole world were at the service of our foes, so that it is hardly surprising that towards the end they had a great preponderance of tanks and guns, i. e., neither in attack nor in defense did they have to employ as many troops as we in order to reach the same goal. That was an immense advantage, of course, which made itself felt in course of time on every occasion.

This advantage was conspicuous, particularly in the last battles of the campaign of 1918. At the end the enemy's superiority, especially in tanks, was very great, and even in artillery the Allies had a heavy preponderance.

All this must be borne in mind in considering the later course of events. The longer the war lasted, the larger the number of killed and wounded on the German side, and the worse the drafts which came out to take their places, the greater became the superiority of the Allies in spite of the immense losses which they suffered. The initiative gradually passed into their hands and their offensive itself took more varied forms. The resources of the defender, on the other hand, were rapidly vanishing. He had no new defensive methods with which to reply to the tanks and the intensified barrage, and while the uses of technical material were

continuously changing during the war he himself had to rely, taking it all round, on the same established methods. The defender could not do more than concentrate his troops the moment he realized an attack was coming, adopt the various defensive methods applicable to the enemy's methods of attack, and otherwise trust to the courage of his troops. Circumstances themselves made it impossible for the German Supreme Command to adopt new methods and recover the initiative—while this was easy for our enemies. It is possible, on the other hand, that it could have organized the barrage better, so that the capacity of the guns could have been made more use of than was actually the case. I will therefore permit myself to add a few words on this point.

II.—The Barrage

We have seen that no infantry attack is possible without the protecting curtain of a creeping barrage, which is designed to break down the last resistance as the storming infantry approaches. Unfortunately the great drawback to such a barrage is that its rate of progress has to be fixed once and for all. Whether the infantry advances quickly or slowly the barrage

goes forward at this regular pace, and thus —as frequently happened during the war— gets too far ahead of the infantry, and the hostile troops recover themselves when it has passed and renew their resistance. On the other side, it may compel its own infantry to go slower than the situation would otherwise permit. Thus the problem of the attacker is to make the barrage elastic, so that it will automatically accompany the infantry advance. In practice, this problem has not yet been solved, and I can thus only make suggestions which have not yet stood the test of reality.

If we look at the practical necessities of the case, the first and most obvious idea is that the regimental C.O. of the infantry should be able directly to influence the pace of the barrage ahead of his unit by using some simple form of flare. This scheme seems perfectly feasible.

The area to be attacked must be divided into barrage zones, with which the regimental zones must broadly coincide, and be indicated by the same color.

If we now calculate two regiments in the front line per division, only four different colored flares will be required, and confusion will be impossible. If the line of attack is composed, as it generally is, of more than two

divisions, the alternation of colors in the other sectors will have to be settled, but, in any case, red, yellow, white and green will be enough. Of course, it is possible that there may be a gap between two regiments where, according to requirements, the barrage of one is going faster or slower than the barrage of the other. This, however, can never make much difference if the regimental C.O. knows his business, and the enemy will never be able to use it to break through the infantry line.

If in the course of the attack one regiment crosses into an adjacent zone, it must, of course, let the artillery commander in this zone know, and use the color of the new zone when it wishes to signal to the artillery. As it will always be doubtful whether the latter will see the signal, there must be special observation balloons, one per division for example, which will pass on the signal to the batteries which are supplying the barrage in the sector in question. On seeing a flare of their own color, for instance, these batteries would bring back their barrage to their last two hundred-meter line in fifty-meter stages, each lasting five minutes, and then again send it forward automatically if no further flares are sent up. Of course, the time can be fixed otherwise. Everything de-

pends on the speed with which the attacker thinks his infantry can advance. It is advisable not to ask too much of them in this way. The reasons are obvious, and besides it is as well that a regiment should have working arrangements with adjacent regiments.

In any case a slow barrage is to be preferred to a fast one. The attacker can be far more certain that his infantry will keep up with it and will not need to make much use of their flares. But it is certain that such an elastic barrage will be possible only if it is quietly and systematically prepared for beforehand. Such preparations can be made only when the army has been brought back before the attack. Generally speaking, under no other circumstances will the attacker be able to insure that no batteries fire out of their proper color-zone, and that batteries are emplaced in the direct line of fire. It is equally necessary that the commanders of the infantry regiments and those of the artillery be perfectly familiar with the zones in question. As a rule all these officers will have an adequate knowledge of the ground only when they have had an opportunity to study it closely and carefully before the retreat.

Thus, in general, the elastic barrage can be re-

sorted to only when a retreat has been planned before the attack and when the various color-zones are in a straight line, as otherwise it will be impossible for the infantry-gun batteries to keep one line of fire all the time, though this is absolutely essential, allowing for the slight variations which are inevitable with every barrage and particularly the elastic barrage.

III.—The Decision in Trench Warfare

The operations which are intended to bring about a decision in trench warfare are to all intents and purposes the same as those in which there is no such intention, but in the first case the attack is mounted quite differently. In the one case the distribution of the troops is practically uniform along the whole line, though the configuration of the ground and the behavior of the enemy may involve a comparative concentration of troops at one point or another. Such operations will be based on strategic considerations only if their purpose is to capture some particular area. It is a totally different matter where the whole mounting of the attack is determined by the intention to secure a decision. In this case the troops will be massed *behind that wing on which the decision is sought,* and at this point a double objective will

be assigned to them. The front line will have the duty of thrusting straight forward and throwing back the enemy as far as it can. The task of the second line will be to wheel outwards and roll up that wing of the enemy with which it comes in contact.

The object of these moves will be to effect a real rupture of the enemy's lines at the point of impact, so that there will be a wholesale breach of the hostile system of defenses, and the troops which are rolled up from the flank will be completely separated from those which have been driven straight back. Of course the enemy will do his best to prevent this. He will bring up reserves from all points in order to hinder a complete rupture and close the breach. That is exactly what must be prevented, and for this purpose the attacker will have reënforcements ready and will therefore make the troops he has massed behind the wing so strong that if necessary he can hurl a superior force into the gap. As a rule, cavalry will be used for this purpose, as it can get ahead very quickly and throw back such of the enemy as it finds in the breach. This cavalry will be given an adequate force of artillery, so that it can deal promptly with the enemy. We can now easily understand how it was that the English

and French assembled their cavalry behind the battle-line in order to complete and exploit the rupture. But they did not use this arm properly, for they always sent out their cavalry at the moment they met too strong a hostile force, and therefore had to attack frontally. Of course that must be avoided. The cavalry must be held back until the area in question is practically free of enemy troops, and must then be distributed in two groups which separate in wholly different directions. One of them makes for that part of the enemy's line which is to be rolled up, and the other for the sector which can only be thrown back frontally. Both must press forward with the greatest energy in order that between them the ground may be thoroughly cleared and they themselves may have the freedom of movement they require.

It will therefore be necessary to concentrate a large mass of troops at this point and press forward as quickly as possible so as to prevent the enemy from bringing up reënforcements in time. We shall therefore intensify the artillery preparation to the highest possible degree, and also keep a strong force of artillery, ready horsed, which we shall be able to employ at once against the portion of the enemy line

which we intend to roll up, while our main advance proceeds remorselessly.

Our road system must correspond to the greatness of our task, and proper arrangements be made for the supply of ammunition. For, of course, an enormous amount of ammunition will be required if we are both to make rapid progress in front and also have enough available for our attack on the flank. Rapid progress at this point is of quite special importance, and it will be facilitated to a very great degree if we succeed in taking the hostile forces here, which must simultaneously be attacked frontally, under a concentric fire, so that we can soon compel them to give way and rapidly extend the breach, into which the cavalry can hurl itself.

The latter must go straight on only until it is more or less out of the enemy's range. It must then separate into two bodies, as I have said, and turn against the enemy's communications. The main and field railways in particular must be attacked and destroyed, or, at any rate, those which might serve for bringing up hostile reënforcements, ammunition and troops. Of course they will not destroy the sectors which the attacker will subsequently

need himself if he is to press his advance at the highest speed.

It will thus be seen that the most thorough preparation is required to effect a real breach at any particular point, and that an immense amount of thought is necessary if we are to see clearly on every point. Nothing may be left to chance. Once the breach has been made, everything turns on the operations on the enemy's flanks, for it is only at this point that a decisive victory can be secured. Circumstances will decide at what point we shall seek this decision, but as a rule the critical thrust will be against that part of the enemy's line which was not originally attacked frontally. The bulk of the attacker's troops will be employed against this sector, because the enemy will be least prepared for an attack here. It may also be, of course, that the sector which is originally attacked only frontally is intended to be rolled up also, so that the center of gravity of the whole operation is on the enemy's inner wing. In both cases a very large striking force will have to be brought through the gap, once it is made, in order to keep the action going and force a real decision. In the second case there is probably greater danger of failure, for, whatever the rate of the advance, the enemy will

generally succeed in bringing up reënforcements to the front which is menaced by the frontal attack, and we shall have to deal with these at once.

When the attacker has broken through, he must deploy on an ever extending front as he advances, in order to secure his own outer wings against envelopment. They must be secured on both sides, for the enemy will always try to bring up reënforcements from both sides, and thus close the gap. The main thing will be to destroy the railways which run parallel with the front attack, and it will easily be understood that cavalry are best fitted for this work. They alone are able to move with the speed this work requires. It is obvious that under these circumstances they must press forward without stopping and live on the country and the enemy supplies they manage to find, without troubling about their own communications. It will also be realized how important it is to get our railways up behind the troops which have broken through, and how thoroughly this "follow-up" must be organized if the break-through is to be a real success.

It will thus be readily appreciated that an attempt of this kind cannot be frequently renewed, so that we must have a two- or three-fold

superiority before we take up this two-edged weapon which often compels the concentration of masses of troops, and therefore makes it doubly difficult to conceal such a concentration from the enemy.

Thus, the most important preliminary question of all is the point at which the breakthrough is to take place, for upon this will depend the success of the whole operation, apart from the purely technical preparations. This brings us to the vital question, What *is* the decisive point? If my reader wishes to look into this question more closely, he will find it in the appropriate chapter in the second volume of my book, *Vom heutigen Kriege.*[1]

I will only say here that, on the one hand, it depends on purely tactical considerations, and on the other—as soon as the decision of the whole war is in prospect—on questions of a geographical and political nature. The decisive point can never be settled by purely theoretical considerations. This matter can be illustrated only by actual examples, because circumstances vary in every individual case. Against Russia the vital direction for a German attack was against Petersburg through the Baltic Provinces, the right flank being adequately pro-

[1] Vol. II, IV, Chap. v.

tected. From Austria it was from Galicia, in the general direction of Moscow. In the west, on the other hand, several decisive points must be distinguished, each depending upon the political situation. As long as England was not participating but only threatened us with her intervention, or had merely her weak regular army on French soil, the direction of Calais was undoubtedly decisive, as Count Schlieffen had always insisted. On the other hand, as soon as the English new armies appeared in France the decisive direction was the line which separated the English and French armies.

England was undoubtedly the more dangerous enemy, the adversary whose will was hardest to break. Thus our best plan was to destroy the English army first, and thus compel England—where the coal shortage could at the same time be made absolutely intolerable, because she had to supply her allies, practically single-handed, with the black diamonds—to make peace. After a successful break-through, we should thus turn against the English army and destroy it, while standing on the defensive against the French for the time being. Of course we might have gone to work the other way: attacked the French army first, while adopting a defensive attitude towards England,

if we regarded France as the more dangerous opponent.

When the intervention of the Americans was in sight, everything turned on forcing a decision as soon as possible before the American army could appear on the scene. Whether we were really strong enough to attempt this is another matter which I shall not inquire into here. The historical material so far available does not enable us to come to any decision. I shall therefore pass no sort of criticism on our Supreme Command, as their reasons and motives are unknown to us. We are simply discussing purely theoretical considerations.

From that point of view the only thing to be said is that a particular direction cannot be regarded as vital once and for all, and that each case must be decided on its own merits. The tactical side of the question must also be borne in mind. The tactical advantages or disadvantages may be so important that they outweigh strategic considerations. It is for the commander in chief alone to decide what particular course shall be taken, and his personality will play a very important part in the decision. One man will venture more than another, and thus have greater prospects of success.

The decisive direction will thus always be

fixed by considerations which can be determined beforehand. The defender, on the other hand, will find it very difficult to ascertain for certain at what point his enemy intends to seek a decision. In certain circumstances all he will be able to do is to drag out the war so long that the attacker will finally decide to make peace. In this case there is no decisive point for him except in so far as it is his business to divine the enemy's intentions accurately, and to find out in time at what point of the front he is thinking of breaking through. He will then send up all his reserves to that point, though it will be important—as it is always important in the case of bringing up reserves—not to detrain these troops too near to the fighting line. If that happens they cannot be sent into action systematically, as they will not be concentrated in a large mass, nor will they be in a position to take up a line in which they can offer an effective resistance or themselves pass to the counter-offensive. The defender would run the risk of putting in his reserves by driblets without achieving his purpose.

The defender must further realize his danger in time, and must be able to decide whether an ordinary or a decisive attack is in progress, and therefore how many men he must bring

up. He must know the direction in which the decisive thrust will be made and he must be able to calculate from a number of thoroughly uncertain factors how near he can bring up his reënforcements by his lateral railways without exposing them prematurely to defeat. He is thus swimming in a sea of uncertainties.

At the same time we must concede to the defender the advantage that all these drawbacks make themselves fully felt only when the attacker succeeds in keeping his preparations for attack from his enemy altogether, or at any rate so long that the latter is not in a position to take effective counter-measures. Of course that is a very difficult task, and doubly difficult where it is a matter of effecting those immense concentrations of troops which are necessary for a break-through and are intended to play a part which is to decide the whole war. Every conceivable precaution must be taken to conceal the intention to attack from the enemy. Such a precaution, and the most important is the combination of the attack with a previous retreat. Thus when we contemplate an offensive which is to decide the war (because the general situation imposes such a step upon us), it will be advisable for us to associate it with a retreat. That will make it far easier for us to

concentrate unobserved the great masses which are required for such an undertaking.

IV.—Attack and Defense in Open Warfare

Open warfare is always either the sum and substance of military operations, or else it has a tendency to settle down into trench warfare. That is inevitable. As long as the attacker is pressing forward he is always endeavoring to secure a decision by arms. The defender either accepts battle or evades his thrust. In the first case, the defender can choose whether to fight for a decision then and there, or to take to trench warfare. He will adopt the second course when the retreat in which he falls back on his reënforcements has brought his forces up to such a level that he thinks he will be able to accept battle. This was the case with the Russians at Borodino. He will take to trench warfare when he has enough time and troops adequately to prepare the position which he proposes to hold. The nature of the ground—whether suitable for defense or not—will be one factor. In this case the ordinary laws of trench warfare will apply.

If open warfare continues, the commander in chief must bear in mind the laws which hold good for this form of operation, and so the

decision becomes the vital matter. This is what actually happened at the beginning of the war, as well as in the Russian and Rumanian theaters later on. Where the two sides came in collision and there were no continuous fortified lines, so that there was a certain amount of room for maneuver, a decision was always sought and very soon secured. It was thus with the battles in Belgium and France, Hindenburg's famous campaign in East Prussia, the retreat into Silesia, the invasion of Wallachia, the advance on Brest-Litovsk, and the campaign which ended with the capture of Riga and the invasion of the Russian Baltic Provinces. These are the operations which alone we are considering. In them envelopment recovers all its old rights. The greater the range of weapons and the fewer the fortifications and other technical devices of trench warfare which are encountered, the greater will be the part envelopment will play.

As regards the strategic aspect of these operations, we may certainly stand by what I said in my book, *Vom heutigen Kriege,* which appeared shortly before the war, but we must pay special attention to the tactical changes which characterize this war and distinguish it from all previous wars.

The following points deserve special notice: (1) the improvement and increase of the artillery; (2) the far-reaching changes in infantry and cavalry methods; (3) aircraft; and (4) supply, which has become much more formidable owing to the masses employed. Other elements do not apply so much to open warfare, as they are not likely to be present as a rule, owing to the short time available.

The tanks alone require a special mention. No experiences of their employment in open warfare are available, but there is no fundamental reason why they cannot be incorporated in the march-columns like other troops, and subsequently employed in battle for their special functions. We may expect to find tanks in open warfare in the future, and particularly where the road system is such as to permit uninterrupted use being made of them. We must be familiar with the methods of operation which are necessary in dealing with tanks, and in some circumstances we shall use them ourselves. How far their employment will extend cannot be foreseen at the moment. For that reason we must have a very clear idea of the future factors which are bound to influence any future war.

In the first place we must concentrate at the

decisive point a very much larger force of artillery than in the past and it must include heavy guns, for the attacker will not merely have to shake the nerve of the hostile infantry, as in the old days, but to silence the defender's artillery and render his infantry utterly helpless in order to permit the approach of the attacking infantry to the enemy's lines. Thus speed is everything if the enemy is to be prevented from bringing up reënforcements in time. This was equally true of the wars of the past, but we must not forget that the enemy also will have a very much larger force of artillery, so that it will not be as easy to silence it as it used to be. The result is that we must appear at the decisive point with a relatively far greater superiority than hitherto. Yet the fact that so much greater a mass of artillery is required complicates and retards all movements, so that it is necessary to have a road system such as was never seen in past wars. Where such a system does not exist the preparations for the attack will take much longer than hitherto because the roads required will have to be made first. It will be essential to keep this period as short as possible.

The second point which we must discuss concerns the new methods of infantry and cavalry

fighting. The methods of both these arms involve the use of machine-guns and hand grenades on a much larger scale than hitherto, and for that reason the attacking infantry must be able to get close to the enemy. Hence the increase of the artillery.

As the cavalry will seldom have a chance of fighting mounted, but will usually take part in action on foot, the decision cannot be secured so soon as in the past. *After* the action, on the other hand, this arm will have to make an even greater use of its speed in maneuver if it is to perform its special functions. It will certainly preserve its functions of reconnoitering and operating against the enemy's communications, with the sole difference that it will make greater use of firearms, and therefore the actions will not be over so quickly as in former times.

We shall thus realize how important these reconnoitering elements are. During the World War we were, of course, practically forced to do away with our cavalry, but this was due only to bitter necessity because the infantry and even the supply and transport personnel are more important than the cavalry, and it is impossible to conduct military operations without them. All the same, cavalry are quite indispensable if we want to make war with any

prospect of success. I attach special importance to this point because I can see that it is on this very arm that our modern national benefactors—who know nothing whatever about the realities of war—have fixed their eye, and intend to procure the complete abolition, or, at any rate, wholesale reduction, of the cavalry at any price.

It must not be. It is the cavalry which must be active in front and on the wings of the armies, so as to prevent the enemy from finding out what is going on on our side of the line. In doing so it must act offensively by preference for, from the tactical point of view, it is only by the offensive that it can score successes. It will fight mounted, if at all possible, for otherwise it will not win that speedy victory which is strategically necessary. Of course all this depends to a certain degree upon the action of the enemy's cavalry, which will use its firearms also, and thus attempt to force an action. In such a case it will be essential to try to prevent the attack from being frontal and to avoid a dismounted action by executing a flanking movement, thus enabling us to continue our reconnaissance. We shall have to be very careful that in so doing we do not imperil our own retirement, or allow our screening work to be in-

terrupted, for as a rule these are the vital elements in strategic maneuvers. This double object can best be secured by a skillful distribution of the troops and by patrols. It is safe to bet a hundred to one that the enemy will retire when he finds himself outflanked, and it is very doubtful whether he will be in a position to send out enough patrols to continue his own reconnaissance. Boldness is doubly necessary for the cavalry.

The third point which requires consideration is the improvement and increase of aircraft and particularly its effects on military operations. Its existence has put the art of war on quite a new footing. Marching in former times was ordinarily regarded as a daytime operation. Night-marching has now become an essential factor in military activity. Of course there was plenty of night-marching in the old days. Frederick the Great, for example, ventured on a night-march before the Battle of Hohenfriedberg. But this was none the less exceptional, whereas to-day night-marching has become an ordinary feature of troop movements. Everything which it is desired to keep from the enemy must be carried out at night. It frequently happens that one part of our troops—as many as the enemy can be allowed to see, if it cannot

be helped—is moved by day, while the rest are moved by night. In this way we shall make the greatest effort to conceal from the enemy the concentration of our forces at what we consider the vital point. It is easy to imagine the immense influence which such methods must have on the whole art of war.

Even more important, perhaps, is our own reconnaissance work and the effort to obstruct that of the enemy, particularly in open warfare, where one side or the other will always be on the offensive. Everything must be done to find out how the enemy's armies are distributing while hindering *his* reconnaissance activities. Aircraft can work only by day and in a good light. It is almost impossible to obtain sufficient knowledge of the enemy's movements by the use of cavalry under modern conditions, as in present-day warfare such long fronts must be anticipated that the cavalry could not reach *any* point from which the whole of the enemy's movements could be seen and prompt information brought back. Reconnaissance from the air is, therefore, a necessity, and should be combined with cavalry reconnaissance. The reports thus received will give the best picture of the development of events which is possible under the circumstances. We shall

send out our aircraft as far as possible over the hostile lines so that they can find out, if allowed to, what is going on behind the enemy's front. At the same time we shall do everything in our power to conceal our own army and its movements. Even that will be impossible with cavalry alone, and in any case very difficult if the cavalry force is not strong enough.

Thus we shall not be able to carry out these operations—reconnoitering for ourselves and preventing the enemy from doing the same—unless we obtain such a domination over the hostile aircraft that they are unable to perform their functions. The attacker must, therefore, try to obtain the mastery of the air just as he must reduce the enemy's cavalry to powerlessness, and for this reason it will probably be advisable in open warfare to attach pursuit flights to all the columns. These pursuit flights will have the special task of attacking hostile aircraft and rendering them innocuous. They will have plenty of work. It will be only later —when open warfare has come to an end, either because a decision has been secured or because the transformation to trench warfare is complete—that other types of aircraft, with quite different functions, will be required once more.

In any case, enemy aircraft may cross our

lines even at night. Bombing squadrons have done so frequently. But if they do so their reconnaissance work will not do us much harm because their range of vision will be small. It will always be advisable to show no lights at night, so that the enemy cannot draw any inference from their presence. We must also protect roads with a certain aircraft screen, for even though any particular area cannot be lit up except from a very short distance and when flying very low, it is possible to illuminate sections of road, and the enemy can thus find out whether there is any traffic or not.

We must also consider the question of supply, which bristles with difficulties for the attacker. Generally speaking, it will be impossible to live on the land, as no theater of war will have sufficient supplies to stand the passage of a modern army more than once. All the ammunition and food required must, therefore, be taken with the troops. My book, *Vom heutigen Kriege,* shows how difficult that is. It will certainly be necessary to help ourselves out at times by making greater use of our iron ration. Our columns will always have to do a good deal of marching by night, and to a certain extent we shall have to make new roads and railways to effect the necessary movements. Indeed,

where the conditions of the battle area require, we shall have to take mobile railways with us so that we can lay down lines quickly in an emergency. I discussed this operation earlier on. The laying of such lines is undoubtedly an excellent method of deceiving the enemy.

If we establish railway arteries behind the whole line of our advance, the enemy can never tell which of them are serving the main attack, especially if the attacker succeeds in screening the movements on these lines. It is only when the defender realizes where the main blow is coming that he can take useful counter-measures and develop his own railway system accordingly. Even then he will be compelled to construct his new lines more or less parallel to his front. If he has to retreat he will perhaps abandon them to the enemy, while the advance of the attacker is favored by the fact that from the outset his railway communications lead straight and uninterruptedly to the front.

Turning to the case of the defender, much that has been said about the attack will apply to him also. In infantry and cavalry operations he has the same prospects of success as the attacker. This is equally true as regards aircraft and artillery. His greatest disadvantage is the fact that he can effect a concentra-

tion of these arms only in reply to some movement on the part of the enemy. Thus it is absolutely vital for him to find out the enemy's intentions *in time*. If he does not do so he cannot take effective counter-measures, as I have said. He will thus concentrate the infantry and artillery required for the defense on the decisive wing—distributed in echelon behind the threatened point—and the bulk of the cavalry will likewise be posted there. The disposition to be preferred is the concentration on the flank and somewhat in rear of the wing, both because this gives longer time for the concentration than a simple extension of the front and also because it enables the defense to be conducted offensively after the enemy has begun to attempt the envelopment of the front with which he has established touch. Yet the latter operation must always be the attacker's goal, as it offers by far the greatest prospect of victory.

If we succeed in finding out the distribution of the enemy's forces in good time, it will be advisable to give or accept battle—the battle for a decision—somewhat farther back, as the decision can be secured only by a general reserve held ready in the rear. This applies to a modern campaign even more than to earlier times.

With regard to aircraft, the chances of con-

centration and success are fairly equal on both sides. On the other hand, the defender would appear to have the advantage at first in the matter of supply.

He is falling back on his supplies, and need not bring them up, as they can be distributed as the retiring movements require. This situation changes, however, as soon as troops have to be transferred unexpectedly to one flank or the other. The movement has not been anticipated, and thus no preparations have been made. In this case the operation bristles with difficulties, particularly when we remember the huge masses employed in modern major operations. In these circumstances the advantage may become an additional disadvantage.

When we sum up finally the prospects of success for both the attacker and the defender we are forced to the conclusion that there can be no doubt about the advantages enjoyed by the former, in as much as the defender must keep his reserves spread over his whole front until he knows how his opponent's forces are distributed, while the attacker is able to work on a definite plan from the start. The upshot is that we must always take the offensive unless it is absolutely impossible.

It is obvious that the character of the coun-

try will have a great influence on our decision. In many cases the determining factor will be the roads, in others the stocks of cattle and food available. For instance, operations in France will take a very different form from those in Russia because there is a great difference between these two theaters in these respects. It will also be admitted that operations in Russia throw a greater burden on the General Staff, and make troop movements exceedingly difficult. Yet the army on the offensive has the advantage from all these points of view. The only advantage enjoyed by the defender is that he usually has more time and greater opportunities to adapt the country to his requirements. We realized that often enough in Russia, where the enemy always succeeded in evading our attack or awaiting it in prepared positions. As a rule these could not be stormed out of hand, and gave the enemy a few days' respite in which to make preparations for the next stage of his retreat. All this brought it home to us forcibly that in the offensive speed and surprise are everything. The attacker must, therefore, stop at nothing to get forward at top speed, and press through every intended attack without a moment's delay. The factor of surprise must be exploited to the full, and thus

an uninterrupted advance is an absolute necessity.

The aircraft must attack first, last and all the time. The army cavalry must develop the highest possible standard of operative nimbleness in working round the flanks and rear of the enemy. It must not hesitate, though it must always be well informed. The fullest possible use must be made of the railways, both the old and the new. But the vital requirement is that the commander in chief be equal to the situation. He must know exactly what he intends to do. He must have the courage, if circumstances require, to denude his front and concentrate the bulk of his force against one of the hostile wings.

In other words, he must seek a decision wherever a decision is to be found.

CHAPTER IX

CONCLUSION

I HAVE come to the end. I have described war as it really is, and I think I have dealt with everything required at the present day for a great struggle between nations. I have shown that we cannot make war in the same way as boys play at soldiers or pirates, but that years of ceaseless effort on the part of the whole nation are necessary to wage it to a victorious conclusion. Masses of men must be called upon, masses such as have never been seen before. What are Napoleon's armies or those of the great national coalition against France compared with this? To-day whole nations are called to arms, superficially for the purpose of satisfying national and economic ambitions, but in reality to struggle for the highest interests of mankind. An artillery will be set in motion the like of which the world has never seen! Modern guns have a range of more than one hundred kilometers, and can simultaneously sweep any selected area in such a way that no

human being can exist there and make use of any weapon!

No region is so fertile or well supplied that it can support such masses for any length of time. None has an adequate railway and road system. In addition, everything the armies require—enormous masses of ammunition and food—has to be sent out to them from home. For that purpose railways and roads are essential, and if necessary they must be constructed. Mobile railway material must be taken with the troops in order to facilitate a rapid transformation to trench warfare where circumstances require, or convey the masses to the decisive point.

The technical resources of war have more than doubled. We fight in the air and under the ground to-day. In the one case we try to blow our adversary up sky-high, and in the other hurl him to earth to meet death and destruction. We dig deep graves in order to find cover against the enemy's fire, and yet get to close quarters with him with the hand grenade and bayonet in order to overcome him in a sheer mêlée.

Never have the sacrifices which our nation was compelled to make been so great as in the recent war; never has so much blood flowed.

The conductivity of the earth has been used to discover the enemy's intentions, and we have communicated our thoughts over thousands of kilometers to the states associated with us.

War can be waged only offensively if it is to have any prospects of success. A pure defensive leads inevitably to defeat.

It is perfectly clear that such operations can be directed and carried out by experts only, and that years of study are required to master the whole range of knowledge which is needed to conduct a modern campaign. Indeed, the entire span of a man's life will be required to cover all the ground. A man who stages such a war in the manner of the dilettante will find that it is lost before it has even been begun.

The course of policy which leads up to such a war because it cannot avert it must be in the hands of men who know the ambitions of the states of Europe, and therefore realize against what forces they may have to fight and what resources are at their own disposal. They must be men who understand how to make war at the right moment, and have the courage to see things as they are and not merely as they would like them to be; men who have sufficient military instinct to know what they are doing when they appeal to the decision of arms and appre-

ciate that they must intelligently follow the directions of the Chief of the General Staff, who will be a permanent adviser. Without courage and resolution no one can either direct an army or lead a state to its goal in the European political game.

May the men who now direct the destinies of Germany ask themselves frankly what is required for war, and whether their "Five-Mark Volunteers," who are possibly serving for the pay and that alone, fight as well as old troops. Are men who obey only when they want to and otherwise do exactly what they like in a position to form an army such as modern conditions require, an army such as our enemies will undoubtedly possess? Let them answer the question whether a Soldiers' Council, which does not even know what it wants and consists of men who have no idea of real war, is better qualified to conduct a campaign than a Chief of the General Staff who has spent his whole life studying the question and is advised by the most expert helpers.

Of course I know that for the moment we are utterly at the mercy of our enemies, and that we are absolutely unable to create a real army after our present government has handed us

over, tied and bound, to the power of our enemies. I also appreciate that the present interests of our enemies require that we should be helpless for as long as possible.

But I know also that a nation of seventy millions, a number which can be appreciably increased when German Austria joins us, cannot be oppressed forever or reduced to the status of a race of slaves. I know that there will be changes in the political sphere also, that there will come a moment—and that soon—when we shall be needed on one side or the other, and that this moment will be favorable for our resurrection. I cherish an unshakable confidence that our nation, which at the moment seems to be sunk in self-seeking, will return to its manhood, and a chastened and ennobled people will arise, who can prove themselves worthy of their great ancestors and even look on war as it really is.

It is most unlikely that I myself shall ever live to see that great day. My life has been spent in helping to build up that state which is a ruin to-day. Yet I write comforting words for the future. What I have written will be appreciated in the days to come, and my words, which hitherto have resounded into the void, will turn

out to be seeds which have not fallen among thorns. In that confidence I lay down my pen for the moment.

Germany will rise again. She has a great future before her!

(1)

THE END

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